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THE RETAIL PHARMACIST AS A PURVEYOR OF PURE DRUGS *

HENRY KRAEMER, PH.D., Philadelphia.

In a recent novel[1] which has attracted considerable attention among pharmacists is the following: "I don't see what bigger thing a man can do than to combine pure, clean, unadulterated roots and barks into medicines that will cool fevers, stop chills and purify bad blood. The doctors may be all right, but what are they going to do if we men behind the prescription case don't supply them with unadulterated drugs?" This seems like a fair question for the layman to ask and the answer to it would seem a simple one, involving only the question of honesty or integrity; but we know that the problem itself is much broader, more complicated and difficult than the writer implies, not only on account of the division of interest and responsibilities, but also on account of the inherent difficulties of the drug problem itself.

That the ideals of the reliable pharmacist are not surpassed by those of the harvester, as just quoted, is shown by an incident referred to by Professor Procter in his address to the graduating class of the Philadelphia College of Pharmacy in 1858.[2] The incident occurred in New York and related to a friend of Professor

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* Read in the Symposium on Drug Standards in the Section on Pharmacology and Therapeutics of the American Medical Association, at the Sixty-Third Annual Session, held at Atlantic City, June, 1912. Reprinted from JOUR. A. M. A., Nov. 2, 1912, pp. 1599-1603.

[1] Porter, Gene Stratton: The Harvester, p. 41, Doubleday, Page & Company.

[2] Procter, William: Am. Jour. Pharm., 1858, xxx, 202.

Procter's whom he called Colton, and who at that time was a prominent pharmacist on Broadway. The pharmacist, having occasion to replenish his stock of cantharides and finding that the wholesale druggist with whom he usually dealt had none, went to another wholesale druggist whom the narrator named Haswell. When Colton entered the extensive establishment the following dialogue ensued:

Colton: "I am informed that you have powdered cantharides of good quality, and I am desirous of getting some that are reliable."

Haswell: "O, certainly! You will find none better. We had the powder made expressly for our sales from selected flies."

Colton: "I am particular in providing this drug, as you know how much depends on its efficient and prompt action."

Haswell: "You may rely on our article as in good condition."

Here the conversation closed; Colton gave his order and left the store. Some weeks after while he was engaged at his counter, Haswell walked in, evidently under some nervous excitement, and the following occurred:

Colton: "Good morning, Mr. Haswell, can I serve you to-day?"

Haswell: "A member of my family has been taken suddenly ill; her physician, among other treatment, has prescribed a blister, and I have come out of my way, believing from your well-earned reputation that we may rely on your cerate, and much depends on the rapid action of the plaster."

Colton: "I have always been careful in preparing this cerate from good flies and, fortunately, in this instance I have your own testimony, in addition, in their favor."

Haswell, who had till that moment forgotten the first transaction, quickly replied: "But, sir! Are you sure those flies were active? Have you tried them?"

Colton: "You said they were when you sold them to me."

Haswell: "But, my dear sir, this blister is for my *daughter!* Don't you understand? For my *only daughter!* Can I rely on it?"

Colton: "For your *daughter!* And so my cerate is for every other man's daughter who deals with me and may need it, and who is as dear to his affection as yours is to you. When I purchased those flies from you, it was your reiterated assurance of their reliability which chiefly induced me to take them, but now I perceive that your language had no real value and was given in the spirit of a huckster. I trust, sir, that this incident will be of use in your future transactions; and for your present comfort I may assure you that your flies were found to be efficient before they were dispensed."

Haswell acknowledged the justice of the rebuke and said that never before had he been properly impressed with the responsibility attached to the wholesale drug business.

INCREASE IN THE NUMBER OF DRUGS.

Until about twenty-five years ago the list of drugs in the Pharmacopœia represented those which were chiefly employed by the physician. At that time it was possible for the pharmacist to have a good oversight of the drugs and preparations which were employed. I can even recall when the Shakers sold directly to individual pharmacists many of the indigenous drugs that were used. While the means for the identification of drugs and chemicals were meager as given in the Pharmacopœia at that time, yet the professional pharmacist by his experience and training was enabled to judge quite well regarding the quality of drugs, his judgment depending much on their appearance, odor and taste. At that time many pharamacists handled the crude drugs described in the Pharmacopœia, and after grinding them themselves made nearly all of the pharmacopœial preparations, as these were all used in sufficient quantity to make it worth while.

Since that time drug-stores have been multiplied, pharmaceutic manufacturing houses have been established in great numbers, large chemical houses have been developed and the number of remedial agents has increased until it is safe to say that the articles in the Pharmacopœia represent but a small part of the substances actually used by the medical profession. While these changes have gone on in pharmacy we must recognize that they have reflected at the same time the changes in the practice of medicine. Such pressure has been brought to bear on physicians by the interests directly concerned that instead of their using pharmacopœial drugs and preparations we find them prescribing extensively the newer synthetics, the active principles and special preparations of manufacturers. The result of all this has been to add to the shelves of the pharmacist a host of remedies which are likely to be required at any time.

Beginning with the use of the standard fluidextract of ergot manufactured by Dr. Squibb, which was extensively designated in the prescriptions of physicians, we have seen this specialization developed and extended until to-day the pharmacist is compelled to carry a line of official preparations made by quite a number of manufacturers. While it is true that the competition among manufacturers and the development of definite standards in the Pharmacopœia have caused the production of a line of assayed drugs and preparations which in some cases at least are superior to and more uniform than those manufactured a few years ago, yet even these preparations may deteriorate or their properties change, in some instances, depending on how long they have been kept in the stock of the manufacturer or jobber as well as on the druggist's shelf. This places a great responsibility on the retail pharmacist, as he must have exact information regarding the value of drugs and preparations at the time they are dispensed. I think it can safely be said that the professional pharmacist usually exercises a great deal of care in selecting drugs and chemicals of good quality and in the making of galenicals which will be found to be efficient by the physician. Furthermore, even with those preparations which he purchases from a manufacturer, he will usually in one way or another make sufficient tests to satisfy himself that they are true to the label, so that there probably never has been a time when the professional pharmacist was more alert and more desirous of working with the physician than at the present. At this point I wish to refer to an article by Mr. Henry C. Blair[3] which, it seems to me, is well worthy of perusal. It is a practical exposition of what a professional pharmacist is capable of doing, and as the article was prepared essentially in the interest of professional pharmacy and was published in a pharmaceutical journal it will stimulate the pharmacists of the United States to endeavor to attain even higher efficiency in the professional part of their calling. My object in mentioning this paper here is to show to physicians that there are among pharmacists those who give serious thought to the question of the purity and reliability of the medicines which they dispense.

It is probably true that there are more pharmacists in business than are necessary to supply the drugs and medicines required by the public; still the number of strictly reliable, conscientious or so-called professional pharmacists probably does not exceed the demand, and by a little inquiry physicians should have no difficulty in determining their location and thus be enabled to direct their patients to them. But of course no business alliance should exist between physicians and pharmacists in such cases. In this way the mere traders, whether doing a small or a big business, would in time become differentiated from the class of true pharmacists, even though they did call themselves druggists; and the two professions would be mutually protected to a greater degree than probably obtains at present. While some physicians might hesitate in a matter of this kind, the question is too important to be neglected, and we should not wait until there is a separation by pharmacy laws of the true apothecary or professional pharmacist from the mere vender of drugs. But laws or no laws, the most reliable pharmacist will always be the one who has the ability and conscientious scruples to take the initiative himself in keeping his stock up to standard.

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[3] Blair, H. C.: The Manufacture of Galenicals by the Retail Pharmacist—Its Possibilities and Limitations, Jour. Am. Pharm. Assn., 1912, i, 17.

Until recently, we may say, and this is particularly apparent if we turn over the pages of a book like that of Dragendorff's[4] with the thousands of remedies there recorded, our principal object in the study of medicinal substances seems largely to have been to collect in one place all the remedies that have been used, thus seeming to indicate that we were afraid of losing something that might prove ultimately useful to mankind. This period is contemporaneous in the United States with the time when the great compilations or dispensatories were popular, these being useful to the pharmacist and suggestive to the physician. Furthermore, our knowledge of drugs, apart from certain tests for identity, has consisted largely of unconfirmed statements regarding their value, so that we may say that the most useless things, like the pebbles, have been too frequently polished, while our knowledge of the most valuable drugs, like the uncut diamonds, remains bedimmed. With the exception of a comparatively few of the vegetable drugs our knowledge regarding their active principles and specific action is more or less indefinite, to say the least, and hence they are for the most part without quantitative standards, even of purity.

Owing to the fact that there are many factors which cause a variation in the constituents of drugs, such as for example those which modify the character and quantity of the constituents depending on how and when the drugs are gathered and how they are cured or dried and subsequently handled, it becomes exceedingly difficult for the pharmacist to furnish a uniform article from time to time, particularly in cases in which there are no standards for the active remedial constituents. The difficulties of the pharmacist, dealing as he does with galenicals containing the constituents of living plants, are in a measure comparable to the difficulties of the physician who finds his patient a living organism with individual variations that preclude his determining with absolute precision the amount or character of response with any given quantity of drug. But as the medical profession is directing its attention as never before to a scientific study of the action of drugs, so the members of the pharmaceutic profession are advancing and attempting to provide drugs and preparations with a definite quantity of active principle.

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[4] Dragendorff, George: Die Heilpflanzen, 1898.

FACTORS IN THE IMPROVEMENT OF DRUGS.

To give assurance of the progress that is being made I may mention some of the factors which are contributing to an improvement in the quality of drugs.

Legislation.—One of the most important of these is the enactment and enforcement of national and state laws relating to drugs and medicines. This beneficial influence has been going on ever since Congress, in 1848, passed the law requiring all imported drugs and medicinal preparations to be inspected before passing the custom-house. In the address of Professor Procter [2] already referred to he calls attention to the fact that at that time at the port of New York alone something like 100,000 pounds of spurious, adulterated and deteriorated drugs were annually rejected and screened out of the market which but for this law would have been distributed throughout the United States. I have not seen the figures showing the amount of spurious and adulterated drugs, which were refused admission into the United States since the passage of the Food and Drugs Act of 1906, but I am sure that it was quite large, as the standards adopted were not only those of the U. S. Pharmacopœia and the Association of Official Agricultural Chemists, but those representing the most recent researches in pharmaceutic chemistry and pharmacognosy. To what an extent we have progressed may be seen from the picture that Professor Procter has given us of the conditions that prevailed fifty years ago.

The power of Congress is limited to the custom-house when it presents us foreign products in good condition. Once beyond the examiner, they are opened to the mercy of American ingenuity; the skill which evidences itself in the production of *genuine* French brandies, wines and perfumes is not slow to enter the domain of medicines, and by the aid of modern alchemy transmute the bitterness of willow bark, and the glossy fibre of the cotton boll into veritable quinine of Pelletier and Caventou. Legislation to meet this evil in its home aspect, must originate and be carried into effect by the authorities of each state; adulterating medicines must be made a felony, punishable by statute, just as any other crime against the welfare of the public health. But amid the diversified interests striving for ascendency at our legislative centres, such wholesome sanitary measures have little chance for a hearing; for while even the reported approach of a pestilence or epidemic will send forth stringent mandates crippling commerce in their unsparing application of the laws of quarantine, the perennial, ever-present evils that we have pictured flourish and extend, unheeded by the fathers of the state.

Since the time to which Professor Procter referred there has been the realization of what seemed to the apothecary of fifty years ago an iridescent dream. The Food and Drugs Act of June 30, 1906, gave us for the first time a national control over the interstate as well as foreign commerce in drugs. During the last five years the act has been enforced to such an extent that Dr. Wiley[5] in his report for 1911 says of the conditions in the New York market: "Continued improvement in the crude drugs is shown. Only a small number of instances of entire substitution of foreign or inferior drugs is reported." There has also been a wholesome influence exerted in improving the quality of domestic drugs. The beneficial effect of the national Food and Drugs Act, supplemented as it is by the drug laws of the several states which have been framed after the national act, can hardly be appreciated except by those who actually handle drugs. While of course there will continue to be a certain amount of admixture or even substitution in foreign as well as domestic drugs, this being due in a measure to the lack of professional knowledge and responsibility of those who collect drugs, yet the whole commerce is being controlled by a strict inspection either at the custom-house or of the goods sold by the large drug dealers. With the seizures that have been made of a number of consignments of domestic drugs on the ground of their being misbranded or adulterated or both, I have no doubt that the large drug-dealers have brought sufficient pressure to bear on the collectors of crude drugs that we may feel that the time is not far distant when the subject of the collection of medical plants, at least in the United States, will be under the control of properly licensed persons. The collectors of medicinal plants should have just as much information, and if anything greater specialized information, concerning crude drugs than is expected of the dealer in crude drugs or retail pharmacists. Why shall the question of the quality of drugs be put to the retail pharmacist as a conundrum for his solution when the collector has the key to the problem? In practical metallurgy who would think of extracting thousands of tons of ore from a mine, roasting and refining it and ascertaining only in the matte or pure metal that the ore to begin with was of low grade? That this has been a common experience with regard to drugs is shown by the numerous analyses which have been published, but this condition has been greatly improved as shown by the fact that during the past year drugs of a higher grade and greater uniformity are to be found on the market.

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[5] Wiley, H. W.: Report of the Chemist for 1911. From Annual Reports of the U. S. Department of Agriculture.

I might add at this time that there are other encouraging signs which show us that not only is the whole commerce of drugs being brought under the surveillance of trained and scientific men in pharmacy and those who appreciate their responsibilities in this work, but also even the growing plants yielding our drugs are being brought more and more under scientific observation and control. The intelligent harvester collecting fresh drugs at the proper season may not only collect drugs that are pure and unadulterated, but also collect those that contain the maximum quantity of active constituents. This interest in the growing of medicinal plants will be found an important factor in improving the quality of vegetable drugs. While the chemical manufacturer, by improved laboratory methods, can furnish us with pure chemicals it is only by the proper study of medicinal plants in the fields that we shall ultimately secure the highest possible improvement in the quality of vegetable drugs. What has been done with plants yielding cinchona, coca, opium, zingiber, Tinnevelly senna, caryophyllus, and to some extent with the plants yielding digitalis, belladonna, and hyoscyamus is likely to be followed with a large number of other valuable drugs in the near future.

Interest in Pharmaceutic Research.—Another factor which is affecting the quality of commercial drugs is the fact that they are being studied more intelligently than heretofore. Until recently, with few exceptions, the scientific study of drugs has been more or less superficial. At the present time greater efforts are being put forth in the study of the active principles. These studies are furthermore being supplemented by the investigations of trained pharmacologists. The result of these investigations must influence not only the practice of pharmacy, but also the practice of medicine. The empiricism of the past is being replaced with the truth of science. The researches of Power and Salway[6] (for instance) in failing to find any constituents in the seeds of the pumpkin that possess tenifugal properties, must influence not only the use of this substance by physicians, but the retention of this article by the Pharmacopœia. The numerous studies on the biochemical assay of digitalis and its preparations which have been published during the past few years and the many investigations which are still going on will shortly enable the pharmacists to supply quite uniform preparations of this important drug. Many illustrations could be given to show that our knowledge of the constituents of drugs is becoming more and more exact, and with this extension of knowledge of the active constituents we are more and more enabled to prepare galenicals which shall represent the true properties of the drug. Furthermore, this knowledge is enabling us to differentiate more clearly those drugs possessing positive medicinal action from those which are slightly efficient or altogether worthless, and by elimination of the latter to reduce the number of drugs. The sooner we can cast all positively useless drugs into the realm of the obsolete the better it will be for all concerned, except, of course, those who are desirous of adding to the number of salable commodities. These investigations, regarding the physical and chemical nature of drugs, form the basis of Pharmacopœia revision, and as the United States Pharmacopœia is the legal standard, it is at once apparent how these two factors, legislation and pharmaceutic research, are contributing most effectively to an improvement and greater uniformity in the quality of drugs of the Pharmacopœia.

Higher Standards of Education.—A third factor making for progress in pharmacy is the higher efficiency on the part of retail pharmacists themselves. This is due to the fact that in some states a newly licensed pharmacist must show that he has had a course of instruction in a recognized college of pharmacy. There has also been a marked improvement in the curriculum of the colleges of pharmacy, so that the graduate has been pretty broadly trained and is usually quite competent to practice his profession. Furthermore, by reason of the increase in preliminary educational requirements, men and women are coming into pharmacy who are better trained and enabled to pursue their studies and take up their responsibilities with credit to their profession and satisfaction to the physician.

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[6] Power, F. B. and Salway, A. H.: Jour. Am. Chem. Soc., 1910, xxxii, 346.

Not only is it true that the professional requirements are being advanced, but even the attitude of the wholesale druggists is such to-day as to convince me that they are realizing their great obligations and responsibilities as purveyors of drugs and medicines. Mr. C. Mahlon Kline,[7] in an account of the recent meeting of the National Wholesale Druggists' Association, says:

> The wholesale dealers of ten years ago were not, nor did they have to be, familiar with the professional side of pharmacy. This condition is not true to-day. The wholesaler has been compelled to assume responsibilities as to the quality of the drugs and medicines he handles, and this has driven him to interest himself in the study of drug substances; therefore, discussions having to deal with problems, standards, scientific methods of production or handling, are now heard with the greatest interest, and the purely commercial side has been forced to recede somewhat from its former preeminent position.

We know that there is a growing disposition on the part of manufacturing houses to employ competent analysts to examine drugs before they are further distributed or made into preparations. With the better output of drugs by the dealer in crude drugs and the manufacturer, and the enforcement of the national and state laws, the labors of the retail pharmacist are considerably lightened, but no one realizes better than he that he must nevertheless be alert in checking the findings of the government analysts and manufacturing houses if reliability is to be ensured in all cases.

Co-operation.—There is still another important factor contributing to the ideal practice that the professional pharmacist ever has before him and that the physician should insist on his living up to, and this is the disposition for mutual co-operation between the members of the two professions. Whatever may have been the grounds for the pessimistic attitude of physicians a decade or so ago toward the pharmaceutic calling I firmly believe that the radical changes that have been going on in pharmacy during the past few years give cause for a healthy optimism, that is, an optimism based on a belief in real progress and an earnest desire on the part of pharmacists to render the best service in their power. This does not mean that physicians shall cease to be critical, but that we shall state our criticisms with candor and fairness in joint meetings where they can be discussed and measures for improvements suggested. And here let me say that to my mind nothing augurs more for the mutual progress of therapeutics and pharmaceutical practice than those agencies which promote the coming together of the members of the two callings for discussion of the properties of drugs and their preparations as exemplified in this Section and the work of the Council on Pharmacy and Chemistry of the American Medical Association, as well as in the "get together meetings" of the local medical organizations with the various local pharmaceutic associations. In other words, if we are to make true progress we cannot well afford to be entirely independent. The words of the late Dr. Musser,[8] an honored ex-president of this Association, in a brief address which he delivered before the members of the Philadelphia College of Pharmacy, still ring in our ears and have done an incalculable amount of good in stimulating us to attain a higher goal in the practice of pharmacy. He said:

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[7] Kline, C. M.: Am. Jour. Pharm., 1912, lxxxiv, 33.

> I plead, therefore, that you make the calling of pharmacy not a profession, but a science, and that you insist that its conduct must be on the highest scientific plane to the end that those who are its devotees may be counted on, in season and out of season, as men having no code and no regulation, breathing only the spirit of doing unto others as you would be done by.

SUMMARY.

In summarizing the points that I have attempted to make in this paper, I may say that the professional pharmacist recognizes his obligations to the medical profession and the dependence which the physician has on him in the dispensing of pure drugs. Furthermore, in spite of their difficulties, there have been professional pharmacists who have consistently tried to handle only pure drugs and to dispense preparations which the physician would find to be efficient.

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[8] Musser, J. H.: Am. Jour. Pharm., 1905, lxxvii, 60.

While it is true that the apothecary is dependent in some measure on the ability and integrity of the large dealer from whom he purchases his supplies, yet he attempts to check in a measure the articles distributed by the manufacturer, recognizing that he stands between the manufacturer and the patient.

Furthermore, there are fortunately a number of factors which are making it easier for the pharmacist to purchase pure drugs and dispense good preparations. These are the enactment and enforcement of drug laws, the greater interest in pharmaceutic research, the higher standards of education in pharmacy and the co-operation between physicians and pharmacists.

Finally, I may say that while the pharmacist is a purveyor of articles that sell at so much per pound or so much per ounce, the ethical standards which guide him in his practice must be as stringent and binding as those which guide the physician in his practice. And while physicians may differ as to diagnosis and as to the relative value of medicines and while every patient reacts more or less variously toward different medicines and toward the same dose of the same medicine, the standards set for the pharmacist must be those of uniformity and efficiency. The one constant in the equation must be the uniform quality of the drug. This is the position we are endeavoring to live up to in our teaching and in our practice, and we desire every possible co-operation on the part of physicians in advancing and maintaining this standard. While we sometimes feel that the medical profession has not sufficiently understood the task we have set out to perform, yet we trust that the physician will appreciate that the pharmacist realizes his responsibility and recognizes the importance of fostering the integrity of their mutual relations if the best results in the interests of the public health are to be achieved.

CANDY—CHEAP AND EXPENSIVE[1]

By Charles H. LaWall.
Chemist to the Pennsylvania State Dairy and Food Department.

The word "candy" is derived from the Orientals by whom sweetmeats and sugar have been used from the earliest times. The Hindustan *Khand* and the Arabic *quand*, as well as words of similar sound in other Eastern languages, signifies "sugar," and are traceable to the Sanskrit word *Khanda*, meaning a portion or piece. The definition of candy in its strictest sense limits it to "any confection having sugar as its basis, however prepared."

The word "confectionery," a broader term applied frequently to candy is from the Latin, *conficere,* to compound, and really embraces all food preparations of the nature of sweetmeats, pastry, etc., which have sugar as a basis or for the principal ingredient.

As the Oriental origin of the word indicates candy is an ancient food product and its early use by Eastern peoples points to an intuitive knowledge of the value and necessity of the carbohydrates as food stuffs. In the early days of the use of candy by European nations, the manufacture and sale of sweetmeats was exclusively carried on by druggists, who, we find in the year 1581 in Nuremburg, entered a protest against the encroachment upon their rights by other persons engaged in trade in a resolution containing the following:

> "May it please the Honorable Council to lend ear to our complaints and in conformity therewith to see fit, in such a manner, to protect our interests, that henceforth we shall not be unduly oppressed by the physicians, and that each of us shall be enabled to enjoy the just results of his labors. The following, Honorable Sirs, forms the substance of our complaint:
>
> 1. The sale of all confections, formerly dispensed by us, has now fallen into the hands of the sugar dealer," etc.

It was manifestly impossible, of course, for pharmacists to control such a rapidly developing business and we find it carried on at present in an entirely separate manner, except for the fact that many druggists carry candy manufactured by others, as a side line, confining their manufacturing operations to such medicated confections as still survive in the materia medica of the present.

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[1] Presented at the American Food Exposition, New York, October 28, 1912.

The manufacture of candy has probably reached the highest degree of perfection and the greatest magnitude in America, although in Germany and in France it is also of great importance, the French word "bon bon" (a duplication of the word "good") having been practically Anglicized and found in common everyday use among English-speaking peoples.

The competitive effort to originate new and attractive forms has caused candy to occupy a peculiar and distinctive place among food stuffs, both as to the attitude of the purchasing public and in the eyes of the law. Coloring matters, even of the permissible varieties, are required to have notice of their presence given to the consumer in the case of food stuffs in general, but in candy the addition of coloring matter is looked upon as an esthetic necessity in order to provide an attractive variety, and therefore any harmless color is permitted in confectionery where its presence is not deceptive and because it is really desired by the majority of purchasers.

In the manufacture of candy the basis is usually sugar or some related carbohydrate such as glucose. A carbohydrate is a complex chemical constituent of food stuffs in which carbon is combined with hydrogen and oxygen, the two latter elements being present in the same proportion in which they exist in water, hence the expressiveness of the word "carbohydrate." The carbohydrates form a valuable class of food stuffs including the starches, sugars and some of the fats and serve as fuels for the animal organism.

Sugar is obtainable from a number of natural sources, the most important of which are sugar cane, sugar beet, sorghum and sugar maple, the first and second sources being used for the refined sugar of commerce, the third and fourth being usually employed in the unrefined condition on account of the attractiveness of the natural flavor. Sugar is also used in candy in the unrefined form as molasses or brown sugar.

Glucose, another carbohydrate used in the manufacture of candy, is not a natural product, but is made from starch by the action of an acid which is afterward removed leaving the glucose in a pure condition. The bad reputation which glucose has acquired in the mind of the public is partly due to the fact that it was formerly manufactured and purified by methods which left it contaminated with harmful substances and also because, as in the case of oleomargarine and butter, it was not sold and used upon its own merits but was secretly employed as a cheap substitute for sugar, which it is capable of replacing to a large extent for many purposes. The name "corn syrup," which is now legally applied to it is misinterpreted by the average purchaser to mean a syrup prepared from corn in the same way that syrup is prepared from the sugar cane. This impression is not correct and is also faulty in that the product can be equally well prepared from any other variety of starch as well as corn starch and in Germany is usually made from potato starch, in which case the name "corn syrup" would not be correctly applied. When properly made and purified, as is done at present, it is looked upon by the majority of authorities as being a wholesome food, the few who disagree on this point basing their objections upon the fact that unlike cane sugar it is not a simple carbohydrate of definite chemical composition, but is a complex mixture of several carbohydrates, of which one of the less important is comparatively indigestible.

When sugar is heated with small quantities of acids, such as are present in many fruits, or intentionally added in the shape of vinegar or cream of tartar in the manufacture of candy, it is chemically decomposed with the formation of a new substance known as invert sugar, which consists of two carbohydrates, both different from the original sugar and one of which is identical with the principal carbohydrate of glucose. This invert sugar, which is purposely formed in certain kinds of candy, possesses the same property as is possessed by glucose, of making a soft creamy mass which does not readily grain or crystallize.

When sugar is heated to a temperature high enough to partly burn or char, there is formed a substance called caramel, which possesses powerful coloring properties and which communicates a flavor which is attractive to many. When sugar is heated to a temperature short of the caramelizing point, it is modified in its character and assumes a state known as barley sugar, in which it is in a solid, glassy, uncrystallizable condition. There are other and intermediate temperatures at which sugar assumes physical conditions varying according to the degree of heat, and therefore such terms as "thread," "soft ball," "hard ball," "crack" and "hard crack" are technically used by confectioners to describe the conditions which the cooked mass will assume upon cooling. This illustrates the infinite possibilities of candy making taking into account the immense number of colors and flavors available for use, and shows how a large variety of forms and consistence may result from the use of a comparatively small number of basic ingredients.

We often hear astonishment expressed at the fact that candy can be sold so cheaply and equal astonishment at the fact that it can be made to cost so much. Both sets of critics overlook several important facts which are easily apparent to the reasoning individual. About the cheapest price at which good candy can be sold at retail to afford even a small margin of profit, is 8 or 10 cents a pound. Such candy can be and usually is pure and wholesome, as in it are used only sugar or molasses, glucose, flavors and colors, the total cost of which to the manufacturer will not aggregate more than 6 or 7 cents a pound, and as all candy contains more moisture (added in its preparation) than is naturally present in the ingredients, another element of profit, usually overlooked, is apparent.

When we consider the higher priced candies and the causes for their high prices, we find that not only is the labor expended upon them much greater in proportion (many of them being made entirely by hand while the cheaper candies are made altogether by machinery), but that expensive ingredients such as nuts, chocolate, fruits, etc., are freely used, thus accounting for much of their increased cost.

At the present time it may be confidently stated, I believe, that candy is more rarely adulterated than ever in its history. In the Federal Food and Drugs Act of June 30, 1906, the following specific clause is directed toward candy: "A substance shall be deemed to be adulterated: In the case of confectionery: If it contains terra alba, barytes, talc, chrome yellow, or other mineral substance or poisonous color or flavor or other ingredient deleterious or detrimental to health, or any vinous, malt or spirituous liquor or compound or narcotic drug." We here see a specific prohibition of a number of substances by name. Terra alba is a synonym for powdered gypsum, a pulverized rock resembling plaster of Paris; barytes is another mineral substance, very heavy and insoluble, used principally as a filler in paper manufacture or as a white pigment; talc is powdered soapstone, the substance commonly used as a toilet powder; chrome yellow is a poisonous compound of lead used as a pigment. None of these, with the exception of talc, which has been reported in small quantities in certain candies like jelly beans where it is used as a polishing agent, has been reported as a candy adulterant for years. The manufacturers of candy themselves have, through their trade organizations, brought about a cessation of trade practices which were in vogue some years ago and which were undoubtedly harmful. Even before the publishing of the ruling of the U. S. Department of Agriculture, in which a list of permitted colors was given, these same confectioners' associations both here and abroad, had been working toward the same end, namely, encouraging the use of a certain few colors which were known to be harmless and the discouraging of the use of a large number which were either known positively to be harmful or were of doubtful character. This is not to be taken as meaning that all candy manufacturers lived up to these rules or that no adulterated candy has been sold, for the published records of the Federal cases and the Proceedings of the many State Dairy and Food Commissioners have shown otherwise.

There have been found in candy in the past, and prosecutions have been brought and sustained against the cases, such products as sulphur dioxide, a bleaching agent formerly used extensively in glucose but now discontinued for that purpose, and also found in candy as the result of the use of impure gelatin or glue; shellac and similar waterproof glazing materials sometimes carrying with them other harmful constituents such as arsenic; alcoholic liquors, and sometimes fusel oil in cordial drops; brown mineral pigments in imitation of chocolate, and other constituents equally discreditable, but by far the greater proportion of the candy sold for some time past has been free from positively harmful ingredients.

In 1911, working under the direction of State Dairy and Food Commissioner James Foust of Pennsylvania, I made an extensive investigation of more than 250 samples of candies, particularly of the cheap varieties, and of this number only 4 cases were recommended for prosecution, 3 for the use of small quantities of talc and 1 for the use of sulphur dioxide as a bleaching agent. The detailed result of the examination of these 250 samples, together with comments thereon, were at that time published as Bulletin 216 of the Pennsylvania Department of Agriculture and observations were made of particular facts which I believe to be worthy of repetition at this time because I believe they are still applicable to trade conditions.

The criticism which can justly be brought against many cheap candies is not on account of the presence of constituents harmful in themselves, but partly on account of the careless manner in which such candy is handled and exposed for sale, thus rendering it liable to all kinds of contamination, partly on account of the indigestible character of some of the puffed up penny marshmallow specialties, and partly because by the competitive efforts of the manufacturers to provide novelties, such candies as are in the form of flexible belts, necklaces, tubes, etc., or are in the form of toy doll babies, soldiers, whistles, guns or marbles. These latter are usually played with by the child before eating, with results that would make a bacteriologist hold up his hands in horror.

Prize package candies have also been observed by me in which small tokens made of poisonous metals are imbedded or are in contact with the candy itself.

Some of these needed reforms can be brought about only through the co-operation of such manufacturers as realize and accept the responsibility for the perpetuation of such discreditable conditions. Other reforms must be stimulated by the education of the vendor of cheap candies, who in the city is frequently a sidewalk merchant and who must be compelled by law if necessary to protect his customers, most of whom are unable to protect themselves by reason of their tender ages. I have seen candy sold by these vendors that was not only filthy as to external appearance but was also alive with vermin requiring a close examination for their detection.

One of the frauds that is frequently perpetrated in cheap candy is the substitution of cheaper, and frequently less digestible substances for chocolate. The manufacturer of such products protects himself by avoiding the use of the word "chocolate," either on the package or the invoice. In many instances, the retailer, though careless, is ignorant of this condition and of course the purchaser is the one eventually deceived, either with or without the connivance of the manufacturer or retailer. This condition should also be remedied. When a candy which looks like chocolate is made wholly or partly from any chocolate substitute, the same protection should be afforded the purchaser as is given in similar instances in other classes of food products.

In the more expensive candies these conditions or others of a similar character are less likely to occur. One which I call to mind is the fact that most of the crystallized violet and rose leaves which are used partly for their decorative effect in expensive box candies, are artificially colored, and that in some cases what look like candied violets are in reality selected popcorn flakes ingeniously colored and sugared to give the appearance of violet flowers.

These few facts regarding candy are herewith presented in the hope that their dissemination will lead to a more widespread interest in the matter which will ultimately result in the still further improvement in the purity and wholesomeness of candy, cheap and expensive.

RHUBARB AS A SOURCE OF COLOR IN PLACE OF GOLDEN SEAL.

By John K. Thum, Ph.G., Pharmacist at the German Hospital, Philadelphia, Pa.

Hydrastis or golden seal is frequently used for its property of imparting a golden-yellow color to liquid pharmaceutical preparations.

At the hospital with which I am connected, we have been using it for many years to give this color to our liquid antiseptic or "Listerine."

The exorbitant price demanded in recent years for this drug, makes its use altogether prohibitory for this purpose. Naturally, a substitute to take its place is desirable and one was sought for among vegetable drugs.

Rhubarb was the drug whose possibilities impressed themselves on the writer's mind and after some experimentation, was adopted for this purpose as desirable in every way.

Our method of obtaining the coloring is very simple, namely, the maceration for twenty-four hours and percolation of a definite amount of crude ground drug (3 per cent.) with alcohol to a definite volume.

This alcoholic solution can be used in varied amounts to give golden-yellow tints to any liquid preparation.

THE EDUCATIONAL WORK OF THE COUNCIL ON PHARMACY AND CHEMISTRY OF THE AMERICAN MEDICAL ASSOCIATION.*

By M. I. Wilbert, Washington, D. C.

The object of this paper is to direct the attention of American Pharmacists to the work of the Council on Pharmacy and Chemistry of the American Medical Association and to call attention more particularly to the educational work that has been done in the past and the possible elaboration of this same line of work in the future.

The origin and object of the Council has been well outlined by Torald Sollmann in a series of articles entitled "The broader aims of the Council on Pharmacy and Chemistry of the American Medical Association," published in the Journal of the American Medical Association and since then reprinted in the form of a pamphlet for ready reference.

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* Presented at the meeting of the American Pharmaceutical Association, September, 1911.

The origin of the Council is also recorded in the Proceedings of the American Pharmaceutical Association for 1905 (Vol. 53, pp. 67–69), so that for the time being it will suffice to state that the Council was organized in February, 1905, for the direct purpose of investigating the then numerous and involved problems in connection with the advertising and use of proprietary remedies. As originally constituted the Council consisted of three Sub-Committees—pharmacy, chemistry, and pharmacology—with the late C. S. N. Hallberg as Secretary and "Mainspring."

The functions of the Council were primarily judicial and its first work was to assist in ridding the pages of the Journal of the American Medical Association of the advertisements of secret and semi-secret proprietary remedies.

To appreciate the really far-reaching effects of this work, more particularly the courage required to carry it on, one must compare a number of the Journal published 5 or 6 years ago with a corresponding number of to-day, and note the direct money loss in the way of "gilt edge" advertising that was involved.

At that time wiseacres on all sides predicted that the undertaking was rank folly, that the Journal of the A. M. A. could not exist without the patronage of proprietary medicine manufacturers and that the life of the Council would necessarily be a short one.

Fortunately these prophets had not taken into consideration the fact that the average American and more particularly the average American physician is willing to, and does occasionally, do some thinking for himself and usually follows his thinking up with a practical adaptation of the course that appeals to him.

While the members of the Council, individually and collectively, were maligned and abused in some quarters for being "hare-brained" destructionists, their work was appreciated and praised by the better element in American medicine and in a surprisingly short time physicians all over the country were willing to have the Council adopt much more stringent rules than the originators of the same had dared to hope for.

At a meeting of the Council held in 1908, the original ten rules were amended so as to provide for a more or less comprehensive investigation of the therapeutic claims made in connection with patented and proprietary remedies. A fourth subcommittee, on therapeutics, was organized, and the advertising pages of the Journal were given a second overhauling, resulting, as before, in a considerable loss of revenue from advertisers of a pecuniarily reliable type, but resulting also in a corresponding increase of respectability and an augmentation in the number of subscribers showing that physicians at least are willing to learn and are capable of appreciating sacrifices for an evidently just cause.

No inconsiderable amount of the credit for the final success of the Council is due to the activity of the Chemical laboratory of the American Medical Association under the supervision of W. A. Puckner, the present secretary of the Council.

This laboratory was organized early in 1906 and the annual reports of the work done, while largely made up of reprints of articles published in the Journal are nevertheless interesting in that they present for ready reference the unusual and in many respects original chemical data involved in connection with the work of the Council.

These reports, with the "Reports of the Council on Pharmacy and Chemistry of the American Medical Association," now also reprinted annually, the "Propaganda for Reform in Proprietary Medicines" and the current number of "New and Non-official Remedies" contain a rather complete reflection of the various activities of the Council that are more fully recorded in the 8,000 or more pages of the weekly "Bulletins" circulated up to the present time.

As the total of these reports comprises upwards of 1400 printed pages it would be futile to endeavor to reflect the various accomplishments of the Council in the course of a short paper.

It may be permissible, however, to recall to your attention the work done in exposing the nature of the acetanilid mixtures, the discussion on the misuse of digestive ferments and liquid foods, and last but by no means least the exposition of the misleading claims that were made in connection with Arhovin, Somnos, Isopral, Chinosol, Probilin, Collargol, and a host of other proprietary preparations, now living or dead, which were being marketed by the manufacturers with a view of securing prompt returns on money invested in printers' ink.

Since 1908 the Council on Pharmacy and Chemistry has been increasingly active in a systematic investigation of the various problems that are involved in present-day therapeutic practices and has busied itself with the development of plans for the systematic upbuilding of a rational materia medica by means of which it should be possible to eliminate at once and for always both therapeutic nihilism as well as therapeutic fetishism and to place therapy on a firm foundation of well-established truths.

From the very origin of the Council the members have appreciated the need for conducting an educational campaign in favor of recognized open formula or official medicaments.

The earliest efforts in this direction were undertaken by individual members of the Council through the publications of the Journal Office.

Beginning in 1905, there appeared in the Journal of the American Medical Association a series of articles entitled "The Pharmacopœia and The Physician." These articles were designed to call attention to some of the more reliable, official medicaments and to point out the advantages, to both physician and patient, that might accrue from the rational use of U. S. P. and N. F. remedies.

The articles were subsequently published in book form and have been since reprinted on two different occasions.

Early in 1906, largely through the initiative and instrumentality of the late C. S. N. Hallberg, the American Medical Association published an epitome of the U. S. P. and N. F. under the title, "Manual of the U. S. Pharmacopœia and the National Formulary."

This latter publication proved to be the immediate incentive for the now widespread U. S. P. and N. F. Propaganda that has done so much to direct the attention of retail druggists to the possibility of improving their own standing in the community by developing the professional side of their calling.

Following the publication of these books an effort was made, through a special committee, to induce teachers of materia medica to devote much if not all of their time to the discussion of well-established official medicaments so as to give to future generations of medical men a thorough grounding in the possible uses and limitations of the more important articles in our materia medica.

While this work has not been entirely futile the practical results have not been commensurate with the time and money that has been expended. The reasons for this apparent failure are directly traceable to the redundancy of the present official standards for drugs and medicinal preparations and the ever-threatening possibility of having one of the members of the State Board of

Medical Examiners propound a question regarding the possible uses and action of some little known or practically obsolete drug.

This latter obstacle is now in a fair way of being overcome and with the co-operation of the several state boards and the teachers of materia medica and therapeutics the Council has reasonable hopes of being able to issue a list of reliable medicaments to which systematic instruction in materia medica can largely be confined.

This then leads up to the most recent and perhaps the most important piece of investigative work as yet undertaken by the Council; a systematic review and study of the mooted points in drug therapy. While it is true that here the individual problems are legion it is nevertheless expected that many of them can be satisfactorily studied in a reasonably short period of time and that this work once thoroughly established will be taken up and continued by individual investigation and by other medical investigators.

It is not expected to revolutionize the materia medica of the country in any given period of time but it is expected that a systematic and conscientious investigation of the truth or falsity of certain statements made in connection with more or less well-established remedies will serve to put the practice of drug therapy on a foundation against which the "isms" and "pathies" of the future will rail in vain.

The program, as outlined, is broad enough for all who are interested in the development of scientific medicine to participate in and it is to be sincerely hoped that the members of the American Pharmaceutical Association both individually as well as collectively will lend their aid in clearing up some of the many perplexing questions in connection with the origin, composition and uses of well-established drugs.

THE FUTURE OF PHARMACY IN RELATION TO THE MODERN DEVELOPMENT OF MEDICINE.

By William G. Toplis.

The year eighteen hundred and eighty-one, is destined to become known in Medical and Pharmaceutical History, as the beginning of the most revolutionary epoch, in all of the experience of those branches of endeavor. That year brought forth a discovery whose importance is not yet generally recognized. Not alone is it concerned with Medicine and Pharmacy, but it has performed a most important service in engineering projects of world-wide importance. It may be truthfully said, that this discovery and those it led up to, made possible the building of the Panama Canal. It was a most important factor in bringing victory to Japan and defeat to Russia. It is banishing pestilence from its breeding places everywhere, and no department of life, either animal or vegetable is beyond its influence. It has placed the practice of medicine upon a scientific basis, and inaugurated the era of preventive medicine. The day of curative measures, with which we are most familiar, is passing. In most of the cities and large communities of the world, Public Hygiene has become a very important department of government. Observe our own city of Philadelphia, we have here the largest water purification plant in existence. Its effect, in that city, is to reduce the number of typhoid fever cases, eighty per cent. of the former total, and perhaps one hundred per cent. of the water bore typhoid, peculiar to the Philadelphia water supply. A case of typhoid fever commonly runs three months. In money it is worth from fifty to one hundred dollars to the attending physician, perhaps half of that to the druggist. A similar change has taken place concerning diphtheria. Antitoxin and treatment are supplied to the patient at the expense of the communities in by far the greater number of cases. Smallpox is practically unknown, for similar reasons. Bacterins as prophylactic measures against typhoid, and a number of other diseases, are coming into increased usefulness.

CHEMO-THERAPY.

The latest advance has done astounding things. With one treatment of 606, Salvarsan, specific disease disappears to return no more. At least it seems so at this early date. Much is promised from the same source in the eradication of cancer. Leprosy, incurable, from remote antiquity, seems about to succumb to the new enlightenment.

The extermination of tuberculosis is within hailing distance. And so on through the whole catalogue of ills that plagued the people, unrestrained, less than thirty years ago.

The transcendental discovery by Dr. Koch, that has made possible all of these wonders and many others beside and others yet to come, is the simple fact that microscopic organisms grow in pure culture, upon a piece of boiled potato. This is the cornerstone upon which has been built the whole science of modern bacteriology. With these facts confronting us and others of like nature to follow, we naturally turn to inquire what effect these changes are likely to exert upon the practice of Pharmacy.

Every pharmacist has observed the greatly increased development of the commercial side of the drug business as compared with its scientific side, which rather seems to be accorded to secondary place in the conduct of its affairs, regardless of the fact that this feature is the one that gives it character, and the only one that distinguishes it from ordinary merchandising.

Thirty years ago the physicians whom we knew were high-minded, dignified gentlemen, who held the ethics of their profession in such esteem that they scorned to violate them. We could not imagine any of those, passing out a handful of tablets to an office patient for a fifty cent fee. And yet the man of to-day who practices medicine under such conditions is to be condemned, no more than his predecessors are to be commended, because each of them is a product of the conditions of his day. Truly the change is to be deplored and the remedy is not yet ready. Thus we have a dreary spectacle, the most noble calling on God's green footstool, degraded through its commercial side, into a mad competition for existence. There are some other causes, beside those noted that contribute to the same effect such as increased numbers of individuals practicing both medicine and pharmacy. The latter causes, however, are self-limiting and not necessarily fatal, to the calling as a business proposition, where as with preventive measures well established, it is plain to all that both the practice of medicine and pharmacy as now conducted, come to their end. This does not mean that both doctors and druggists will disappear completely, but it certainly means that a new order of things is upon the threshold.

This is the year nineteen hundred and thirteen. Between the years 1922 and 1932, we may expect to have established a National Board of Health, with a chief officer in the cabinet and an organization similar to that of the Army, and in which every physician and every Pharmacist will be an officer of the United States Government. Those physicians, under the new order who remain in the office awaiting the call of the sick will be comparatively few in number. The remainder will be out in the broad domain of practical hygiene, every factory, farm, field, forest, stream, mine, and what not, will then come under the watchful eye of this new army and with all of the wisdom of science, it will guard the health of the country, if any thing, more jealously than it is guarded against foreign foes. Every occupational disease will be banished, every case of communicable disease will be promptly isolated.

The men who are to perform this service will be the doctors and druggists of to-day who survive at that time, together with those who shall be hereafter graduated in those professions. Not that all of these men are at present fitted for this work, but their training and experience makes them the most available. They will, however, be subject to periodic examinations that shall determine their advance and pay, and each one will gravitate into the place that best suits his capacity. The pay of these men will be suitable to the dignity of their calling, certainly not less than that of a lieutenant in the United States Army. Under this new order the people will receive their medicine and medical treatment upon the same plan that they now receive their public school education. To the incredulous, it may be said that the people of Philadelphia alone spend annually fifteen millions of dollars for medical treatment, and medicine. Under the new system the cost would be less than half of that sum, and the people will receive better attention than at present.

Schools of medicine and pharmacy will be government institutions, such as West Point and Annapolis, and their various laboratories will be the main centres from which the operations of this Hygienic Army shall be directed.

To the incredulous, again, it may be said, these conditions are coming not because they are being sought, nor even desired, but they will be thrust upon us through the force of economic necessity.

DIGITALIS GLUCOSIDES AND ALLIED DRUGS.*

1. General and Historical.

Since the introduction of digitalis leaves into therapeutics by Withering of Birmingham in 1775, digitalis has become an indispensable drug in our materia medica. But in spite of many efforts it has yet been impossible to isolate from this drug a uniformly active substance, which could fully replace digitalis leaves and supplant them in our list of most important remedies. However, the work of Homolle,[1] Quevenne,[2] Walz,[3] Nativelle,[4] Schmiedeberg[5] and Kiliani[6] has led to the isolation of a number of digitalis glucosides, several of which are much valued in therapeutics.

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* Reprinted from E. Merck's Annual Report, Vol. xxv, 1911, pp. 31 to 53.

From the work of the above named authors it is apparent that the digitalis plant contains several glucosides, the physiological action of which varies considerably, both qualitatively and quantitatively. Therefore, before entering upon a consideration of the practical employment of digitalis and of its glucosides, the latter must be examined more closely with regard to their chemical composition and their physiological action. This is imperative for the reason that the nomenclature adopted by different authors in the literature on this subject has led to such confusion as is scarcely met with in any other field of pharmacy or pharmacology.

The first digitalis glucoside to attain any degree of importance in therapeutics was digitalin, prepared by Homolle (1845) from the leaves of *Digitalis purpurea*. Until that time all attempts to isolate an active principle from digitalis had been unsuccessful. Thus Bonjean[7] in 1843, only two years before the publication of Homolle's work, mistook a resinous body for the active substance of digitalis. Homolle himself enumerates the following as his predecessors in the field of research regarding digitalis: Bidault, Planavia, Leroyer, Rein, Haase, Welding, Dulong, Henry, Quevenne, and Tromsdorff. Homolle's method for preparing his digitalin was that formerly much in vogue for the isolation of glucoside-like vegetable substances. This method consisted in clearing the aqueous extract of the drug with subacetate of lead, and after separation from the lead, precipitating with tannic acid; the combination of gluocoside and tannin thus formed was decomposed by adding lead oxide, and the glucoside thus set free was then extracted with alcohol. After the evaporation of the alcohol, impure digitalin remained, this was then freed from fat by means of ether, rendered colorless by animal charcoal and then precipitated from alcohol. The preparation thus obtained consisted of both amorphous and crystalline substances, for which reason the digitalin of Homolle has been described in the literature sometimes as an amorphous and sometimes as a crystalline body. The French pharmacopœia of 1866 retained the method of preparing digitalin as described by Homolle; but this yielded a preparation which was not completely soluble in chloroform. For this reason the pharmacopœia in question required that the digitalin should be redissolved in chloroform and the latter evaporated. In this way "digitaline chloroformique" was obtained as a yellowish-brown, amorphous preparation, completely soluble in alcohol and in chloroform.

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[1] Homolle, Journal de pharmacie et de chimie 1845, I, p. 57.

[2] Homolle-Quevenne, Neues Repertorium für Pharmazie, Vol. 9, p. 2. Gazette des hôpitaux, 1850, p. 53. Union médicale, 1851, p. 69.

[3] Walz, Jahrbuch für praktische Pharmazie, Vol. 14, p. 20; Vol. 21, p. 29, Vol. 24, p. 86.

[4] Nativelle, Journal de pharmacie et de chimie 1869, I, p. 255; 1872, II, p. 430; 1874, II, p. 81.

[5] Schmiedeberg, Archiv für experimentelle Pathologie und Pharmakologie 1875, p. 16.—Neues Repertorium der Pharmazie, Vol. 24, p. 89.

[6] Kiliani, Archiv der Pharmazie 1892, p. 250; 1896, p. 273, 481; 1897, p. 425; Berichte der deutschen chemischen Gesellschaft Berlin, 1890, p. 1555; 1891, p. 339 and 3951; 1898, p. 2454; 1899, p. 2196 and 2201.

[7] Bonjean, Journal de pharmacie et de chimie 1843, p. 23.

Digitalin was now further investigated by Homolle in conjunction with Quevenne, and they succeeded in isolating three different substances from digitalin. By treating it with a mixture of alcohol and ether of specific gravity 0.78, these authors obtained an insoluble residue and a solution. The former they named "le digitalin." The solution in alcohol and ether, when evaporated, left a residue which was only partially soluble in alcohol (50 p. c.). They named the soluble portion "la digitaline," and the insoluble portion "digitalose."

It may be here mentioned that Homolle's further researches, and the nomenclature adopted by him, already introduced a considerable degree of confusion, for the author unfortunately made a distinction between digitalin and digitaline. I shall therefore in the following remarks always add the name of the author, when necessary, in order to avoid errors.

Two years after Homolle's first publication regarding digitalin, Walz began his reports dealing with his work on this subject. He first prepared an alcoholic extract of digitalis leaves and precipitated those substances which were soluble in water (e. g., its aqueous extract) with tannic acid. When decomposed by lead oxide the tannin compound thus formed constituted the raw digitalin Walz. According to Walz, when this substance is treated with ether, fat and two other substances dissolve; the author named these "digitaloin" and "digitalacrin α and β." The residue, which was insoluble in ether, was extracted with water, whereby "digitaletin" remained and "digitalin Walz" dissolved. Walz describes his digitalin as a yellowish, amorphous substance, which is distinguished from the digitalin of Homolle by being soluble in water and only with difficulty soluble in chloroform. The digitalin of Walz formerly also bore the name of "German digitalin," but it should be noted that it is not identical with the digitalinum Germanicum at present on the market, as the latter is prepared from digitalis seeds. However, Walz in the course of his studies on digitalin altered his method of preparation, and later (Cf. Canstatt's Jahresbericht 1850, Vol. 10, p. 22) he describes his digitalin as a crystalline body, very similar to the digitalin of Homolle, soluble with difficulty in water and melting at 175°.

Nativelle isolated three substances from digitalis leaves, namely digitalein Nativelle, a glucoside soluble in water, prepared by extraction with water and subsequent purification, and digitalin Nativelle, (digitaline cristallisée), soluble in alcohol and chloroform, obtained by extraction with alcohol, and thirdly digitin Nativelle, soluble in alcohol and practically insoluble in chloroform; this substance, on account of its physiological inactivity, he at first named "substance cristallisée inerte."

Schmiedeberg obtained from digitalis leaves the first preparation of digitalis which had well defined chemical characteristics and was physiologically active, viz., digitoxin Schmiedeberg; he first extracted the drug with water and then with alcohol (50 p. c.), the alcoholic extract was cleared with lead acetate, and after removing the lead which had dissolved, evaporated the solution to dryness, and extracted the residue with chloroform and distilled off the chloroform. After purifying the residue with ether and animal charcoal, as well as recrystallising it several times from alcohol, he obtained a pure hydrated preparation, melting at 145° C. For anhydrous digitoxin he gave the empirical formula $C_{21} H_{32} O_7$. Digitoxin Schmiedeberg is now simply called "digitoxin." Kiliani, who has made an exhaustive study of digitoxin and its decomposition products found that this glucoside corresponded to the formula $C_{34} H_{54} O_{11}$, and on hydrolysis yielded digitoxigenin and digitoxose. It forms white crystals, which are readily soluble in alcohol and chloroform, but only with difficulty soluble in water and ether.

Kiliani found another glucoside in digitalis leaves. This is a crystalline body, similar to digitoxin, which Kiliani named "digitophyllin." He states that its formula is $C_{32} H_{52} O_{10}$ and its melting point 231° C.

The researches of Schmiedeberg and Kiliani also yielded another body with definite chemical characteristics, viz., digitonin, with the formula $C_{54} H_{92} O_{28}$ [8] which decomposes at a temperature above 235° C. without having a well defined melting point. It is practically insoluble in water, ether and chloroform, it is more readily soluble in alcohol (80–85 p. c.). It is preferable to call this body digitonin Kiliani, because digitonin Schmiedeberg, according to Kiliani, did not represent a pure, uniform substance. Schmiedeberg described his digitonin as an amorphous substance readily soluble in water. Kiliani succeeded in demonstrating that digitonin could be obtained in either an amorphous or a crystalline form, according to the concentration of the alcohol used in the process of recrystallisation. On examination the amorphous preparation was found to be readily soluble in water, while the crystalline body dissolved with difficulty. Kraft [9] considers the digitonins described by Schmiedeberg and Kiliani to be distinct substances and would like to see the name digitsaponin introduced for digitonin Schmiedeberg. While Kiliani formerly (Archiv. der Pharmazie 1892, p. 250) assumed that digitonin was present in both the leaves and the seeds of digitalis, it is stated in his later communications (Archiv der Pharm. 1895, p. 311) that it is only found in the seeds. Kraft states that a body is present in the leaves which can be distinguished from digitonin by its melting point (260–265° C.), its solubility and its behaviour towards cholesterin. Digitonin was isolated by Schmiedeberg and Kiliani, from digitalinum Germanicum. According to Kiliani, when heated with dilute hydrochloric acid it splits up into digitogenin, dextrose and galactose. (Berichte der deutschen chemischen Gesellschaft Berlin 1891, p. 341).

Schmiedeberg also obtained from digitalinum Germanicum an amorphous digitalin with the formula $(C_5 H_8 O_2)n$, the chemical individuality of which, in spite of its amorphous constitution, was confirmed by Kiliani. Digitalin Schmiedeberg forms a white mass, readily soluble in alcohol, hot dilute acetic acid and a mixture of alcohol and chloroform, but is only slightly soluble in cold water, chloroform and ether. When split up by acids it forms digitaliresin and glucose. On preparing his digitalin, Schmiedeberg found another glucoside soluble in water, digitalein Schmiedeberg; when treated with acids it is decomposed into glucose and a body probably identical with digitaliresin.

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[8] See Berichte der deutschen chemischen Gesellschaft Berlin Vol. 32, p. 339 and Vol. 42, p. 239. Note 6.

[9] Kraft, Schweizer Wochenschrift für Chemie und Pharmazie, 1911, p. 175. and 237.

Digitalin Schmiedeberg and digitalein Schmiedeberg were examined more minutely by Kiliani. He was able to prove that pure digitalin, for the preparation of which he worked out an exact formula,[10] forms an amorphous white powder, which swells up in water at ordinary temperature and is soluble 1 in 1000 of water. Moreover, it is said to dissolve in 50 parts of alcohol (50 p. c.) and more readily in hot alcohol. On heating it remains white up to 200° C., begins to sinter at 210° C. and melts at about 217° C. Kiliani gave it the formula $(C_5H_8O_2)_7 = C_{35}H_{56}O_{14}$, but also mentions that it may have the formula $C_{36}H_{58}O_{14}$. According to Kiliani, on heating with dilute alcoholic hydrochloric acid it splits up into digitaligenin, glucose and digitalose. (Archiv der Pharmazie 1892, p. 250.)

Kiliani at first doubted the chemical individuality of the digitalein of Schmiedeberg. Keller[11] and Houdas[12] also took it to be digitonin. But Kiliani proved later that the seeds and leaves of digitalis contain a cardiac poison, soluble in water, which contains no digitalin, the physiological activity of which, therefore, precludes its identity with digitonin. Kiliani and Windaus $_{13}$ suspected the presence of a lactone in digitalein, because its neutral aqueous solution gives an acid reaction on standing. This proves digitalein to be a distinct substance, of uniform composition. Kraft,[14] on the other hand, accepts the nomenclature of digitalein only as a generic term for all the active glucosides which are soluble in water and are present in digitalis. He also places in this class gitalin, an amorphous glucoside, melting at 150–155° C., which he isolated from digitalis leaves. It is more readily soluble in cold (1:600) than in hot water. For this reason it is partially precipitated on heating the solution, and at the same time the glucoside is decomposed. In chloroform it is soluble without alteration in all proportions. If gitalin is dissolved at ordinary temperature in 1.5 parts of alcohol and 0.75 parts of water are added, on shaking the mixture gitalin hydrate will separate. This melts at 75° C., and is only slightly soluble in alcohol and water (1:3000). On evaporating the alcoholic solution of gitalin, anhydrogitalin is formed; it appears at first chiefly as an amorphous body, but on recrystallisation from alcohol it can be obtained in crystals melting at 255° C. Gitalin, and also anhydrogitalin, give a permanent violet color with Kiliani's reagent, similar to digitalinum verum. With Keller's "layering" test gitalin gives an indigo color with the glacial acetic acid and a violet ring at the juncture of the glacial acetic acid and the sulphuric acid.

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[10] Archiv der Pharmazie 1892, Vol. 230, p. 252 and 1895, Vol. 233, p. 299.

[11] Keller, Berichte der chemischen Gesellschaft Berlin 1897, p. 125.

[12] Houdas, Comptes rendus 1891, p. 648.

[13] Kiliani-Windaus, Archiv der Pharmazie 1899, p. 458.

[14] Kraft, Schweizer Wochenschrift für Chemie und Pharmazie, 1911, p. 162 and 173.

Digitalinum Germanicum,[15] obtained from digitalis seeds, is essentially a mixture of digitalin Schmiedeberg, digitonin and digitalein. It dissolves in water and alcohol, but is practically insoluble in chloroform. (Kiliani, Archiv der Pharmazie, 1895, 299.)

In order to obtain a clearer view of the subject, those substances of digitalis with which we have already become acquainted, their synonyms and their derivatives are enumerated[16] in the following remarks and briefly dealt with on the basis of the considerations mentioned above or contained in the literature:

Acrodigitalins are, according to Ludwig, those digitalis substances which do not possess the characteristics of glucosides. (Archiv der Pharmazie, Vol. 194, p. 213.)

Anhydrodigitoxigenin is obtained by the action of concentrated hydrochloric acid on digitoxigenin in alcoholic solution. It crystallises in colorless prisms corresponding to the formula

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[15] According to J. Pereira (Handbuch der Heilmittellehre, translated by R. Buchheim Vol. 2, p. 293), the seeds of Digitalis purpurea were used medicinally in England, as well as digitalis leaves, in the first half of the 19th century, as they were considered more constant in their action than the leaves. The first examination of the seeds for digitalis was undertaken by A. Buchner (Buchner's Repertorium für Pharmazie, 1851, Vol. 9, p. 38.—Canstatts Jahresberichte 1851, N. F. 1. Jahrgang p. 44.)

[16] In the following decription a few special preparations containing digitalis substances are mentioned, as their names resemble the word digitalis.

$C_{22}H_{30}O_3$ (Kiliani, Berichte der deutschen chemischen Gessellschaft, Berlin 1898, p. 2458.)

Anhydrodigitic acid, $C_{10}H_{14}O_3$, occurs in two isomeric modifications, α-acid and β-acid. The α-acid is formed from digitic acid by the action of dehydrating agents. It loses its water of crystallisation at 140° C. and melts at 170° C. The β-acid melts at 263° C. (Kiliani, Archiv der Pharmazie 1894, p. 334.)

Anhydrogitaligenin, according to Kraft, is formed during the hydrolysis of anhydrogitalin, together with digitoxose and a non-crystalline sugar. It crystallises from alcohol, melts at 119° C., and gives a deep violet coloration with Kiliani's reagent. (Schweizer Wochenschrift für Chemie und Pharmazie 1911, p. 173.)

Anhydrogitalin is a product of decomposition of gitalin *q. v.*

Desoxydigitogenic acid, $C_{28}H_{42}O_8$, is obtained by the reduction of digitogenic acid by means of sodium amalgam. (Kiliani, Archiv der Pharmazie 1893, p. 448. Berichte der deutschen chemischen Gesellschaft Berlin 1899, p. 2201.)

Digalen, see digitoxin solubile Cloetta.

Digitalacrin (α- and β-) are components of raw digitalin Walz (cf. page 29).

Digitalein Nativelle was described by Nativelle as a physiologically active glucoside, soluble in water and obtained from digitalis leaves. (Moniteur scientifique 1874, p. 822. — Houdas, Comptes rendus de l'académie des sciences, Vol. 113, p. 648.)

Digitalein Schmiedeberg is a glucoside soluble in water. For details see page 31. (Archiv für experimentelle Pathologie 1875, Vol. 3, p. 33. — Houdas, Comptes rendus de l'académie des sciences, Vol. 113, p. 648. — Kiliani, Berichte der deutschen chemischen Gesellschaft Berlin 1891, p. 3950, and Archiv der Pharmazie 1899, p. 458. Keller, Berichte der deutschen pharmazeutischen Gesellschaft 1897, p. 125.)

Digitaléine Buignet represented the glucosides of digitalis leaves which were soluble in water. (Journal de pharmacie et de chimie 1872, I, p. 191.)

Digitalen is a special preparation for therapeutic use, viz., a solution of digitalis glucosides containing glycerin. (Lüders, Chemische Industrie 1905, p. 261.)

Digitaletin is a product of decomposition of digitalin Walz and is formed from the latter together with sugar by the action of hydrochloric acid. (Compare Roscoe and Schorlemmer, Lehrbuch der organischen Chemie 1901, part 6, p. 682.) The portion of raw digitalin Walz insoluble in ether and water was also included under the name of digitaletin. (Conf. p. 29.)

Digitalicrin, according to Wiggers (Canstatt's Annual Reports 1850, Vol. 10, p. 23), is a constituent of digitalin Walz (raw digitalin), a substance with an acrid and harsh taste, of the formula $C_{11} H_{20} O_3$.

Digitalid, digitalidine and digitalosin are substances which Homolle, in his later publications, states that he found in the leaves of digitalis besides his digitalin. (Roscoe and Schorlemmer, Lehrbuch der organischen Chemie 1901, part 6, p. 682.)

Digitaligenin is a crystalline body corresponding to the formula $C_{22} H_{30} O_3$, melting at about 211° C., and formed in the decomposition of digitalin Kiliani. This preparation is soluble in alcohol and insoluble in water, and is said to have no physiological action. (Kiliani, Archiv der Pharmazie 1892, p. 250. Berichte der deutschen chemischen Gesellschaft Berlin 1898, p. 2454.)

Digitalin with no other specification is a vague term, and should be avoided in the literature and in practice in order to eliminate a source of errors and of confusion. The same applies to digitalinum and digitaline.

Digitalin, amorphous. This designation is probably chiefly intended to cover digitalinum Gallicum (digitaline chloroformique) of the French pharmacopœias of 1866 and 1895, a substance which is completely soluble in chloroform. But it must be remembered that digitalinum verum and digitalinum Germanicum are also amorphous.

Digitalin(um) crystallisatum has so far been used as a synonymous term for digitonin. As this is misleading it would be better to avoid its use altogether. In commerce, however, names which have once been introduced are difficult to get rid of. Kiliani objected to the term "digitalin cryst." as early as 1891. (Berichte der deutschen chemischen Gesellschaft Berlin 1891, p. 3953.)

Digitalin Henry was a mixture of glucosides from digitalis leaves. (Journal de pharmacie et de chimie 1845, I, p. 460.)

Digitalin Homolle is a mixture of glucosides and their products of decomposition contained in digitalis leaves, and is practically insoluble in water. (Conf. p. 28.)

Digitalin Homolle-Quevenne is the constituent of digitalin Homolle which is insoluble in a mixture of alcohol and ether. (Compare above.)

Digitalin Kiliani is identical with digitalinum verum, *q. v.*

Digitalin Lancelot was a mixture of amorphous digitalis glucosides, which was prepared from digitalis leaves according to the directions given by Lancelot. (Die Pflanzenstoffe von Husemann und Hilger, 2nd edition, p. 1234.)

Digitalin Lebourdais was a crystalline preparation obtained from digitalis leaves. (Annales de chimie et de physique, 3rd series, Vol. 24, p. 58.)

Digitalin Nativelle is a crystalline product prepared from digitalis leaves, which is probably not unlike digitoxin in constitution. According to Schmiedeberg and Kiliani, it is a mixture of several substances. (Berichte der deutschen chemischen Gesellschaft 1891, p. 3951, 1898, p. 2462.) Compare also p. 33 and Berichte der deutschen chemischen Gesellschaft Berlin 1898, p. 2454. — Journal de pharmacie et de chimie 1874, II, p. 81.

Digitalin Schmiedeberg is a chemically uniform, amorphous body of the formula $(C_5 H_8 O_2)_7$. (Archiv für experimentelle Pathologie 1875, p. 16.)

Digitalin Walz was a mixture of glucosides from digitalis leaves (compare above). (Delffs, Neues Jahrbuch für Pharmazie 1858, p. 25 [Vol. 9]. — Wittstein, Wittsteins Vierteljahresschriften für praktische Pharmazie 1865, Vol. 14, p. 76.)

"La digitaline" is digitalin Homolle or Homolle-Quevenne.

Digitaline amorphe chloroformique is digitalinum Gallicum amorph.

Digitaline amorphe française is digitalinum Gallicum amorph.

Digitaline chloroformique is digitalinum Gallicum amorph.

Digitaline pharmacopée française 1884 is digitalinum Gallicum amorph.

Digitaline cristallisée is either digitalin Nativelle or digitoxin. Formerly it also applied to digitonin.

Digitaline cristallisée Pharmacopée française 1908 is identical with digitoxine Pharmacopée franç. 1908. Conf. Digitoxine Pharm. franç.)

Digitaline cristallisée française is digitalin Nativelle.

Digitaline française is digitalinum Gallicum amorph

Digitaline Homolle-Quevenne is the constituent of digitalin Homolle which is soluble in a mixture of alcohol and ether and in dilute alcohol, but is not identical with digitalin Homolle-Quevenne, which is insoluble in a mixture of alcohol and ether.

Digitaline Kosmann was a crystalline preparation which Kosmann extracted from the lead precipitate obtained in the preparation of digitalin Homolle. (Journal de connaissance médicale pratique 1845, Vol. 13, p. 67.)

Digitaline passive was the name which Nativelle at first gave to his digitin.

Digitaline Pharmacopée Belge II. is digitalinum Gallicum amorph.

Digitalinic acid (acid digitalinique) was the name given by Kosmann to a body corresponding to the formula $C_{22}H_{35}O_{12}$, and obtained by heating digitalin Kosmann with caustic soda. (Journal de pharmacie et de chimie 1860, II, 15. Homolle, Union médicale 1872, p. 80.)

Digitalic acid Morin is a substance obtained from digitalis leaves. Morin prepared a volatile acid by submitting digitalis leaves to steam distillation and called it "antirrhinic acid" (most probably identical with valerianic acid). He describes it as a colorless, oily mass, soluble in alcohol, but insoluble in water; it dissolves very gradually in water, with which it forms a hydrate. It possesses a characteristic smell and taste. (Journal de pharmacie et de chimie 1845, I, p. 294.)

Digitalinum fluidum was the name given by Engelhardt to a liquid, volatile, oily substance obtained from digitalis leaves, and which he regarded as the active component of digitalis. Zeitschrift für Chemie und Pharmazie .1862, p. 722.)

Digitalinum Pharmacopée française 1908 is identical with digitoxine Pharm. franç., *q. v.*

Digitalinum Gallicum amorph. is obtained from digitalis leaves according to the method given in the Pharmacopée française 1884. It also bears the name of "digitaline chloroformique." It is completely soluble in chloroform and practically insoluble in water. (Conf. p. 29.)

Digitalinum Gallicum crystallisatum is either digitalin Nativelle or digitoxine pharm. franç. 1908.

Digitalinum Germanicum is an amorphous product obtained from digitalis seeds, and is soluble in water. It consists principally of digitalinum verum, digitalein and digitonin. It was examined in detail by Schmiedeberg and Kiliani. (Archiv für experimentelle Pathologie 1875, p. 16. — Berichte der deutschen chemischen Gesellschaft 1890, p. 1555.)

Digitalinum passivum was the name given by Nativelle to digitin.

Digitalinum verum is digitalin Schmiedeberg of the formula $C_{35}H_{56}O_{14}$. (Archiv für Pharmazie 1892, p. 250, 1895, p. 299 and 698, 1899, p. 455 and 458. Berichte der deutschen chemischen Gesellschaft Berlin 1898, p. 2455.)

Digitaliresin is a body formed from digitalin Schmiedeberg by hydrolysis. (Chemisches Zentralblatt 1875, p. 262. Archiv für experimentelle Pathologie, Vol. 3, p. 30 and Vol. 4, p. 191.)

Digitaliretin, $C_{30}H_{25}O_{10}$, is, according to Kosmann, an amorphous body formed by the splitting up of digitalin Kosmann under the action of sulphuric acid; it is only slightly soluble in water, alcohol and ether, but dissolves in hot alcohol. (Journal der pharmacie et de chimie 1860, II, p. 1.—Rochleder, Chemisches Zentralblatt 1863, p. 46.—Schmiedeberg, Archiv für experimentelle Pathologie, Vol. 3, p. 26.) Walz also obtained a digitaliretin by the decomposition of his digitaletin q. v. Neither the preparation of Kosmann nor that of Walz can lay claim to uniformity. (Husemann-Hilger, Pflanzenstoffe, 2nd edition p. 1235.)

Digitaloin is a compound of raw digitalin Walz. (Conf. p. 29.)

Digitalon is the lactone of digitalonic acid. Melting point 138–139° C. The name "digitalon" is also given to a special preparation—a solution of all the glucosides present in digitalis—to be used subcutaneously in doses of 0.5 to 1 c.c. (Pharmazeutische Zeitung 1904, p. 760, Therapie der Gegenwart 1905, p. 398.)

Digitalonic acid, $C_7H_{14}O_6$, is obtained by the oxidation of digitalose. (Berichte der deutschen chemischen Gesellschaft, Berlin 1892, p. 2116, 1898, p. 2454, 1905, p. 3621, 1909, p. 2610.)

Digitalose is a sugar corresponding to the formula $C_7H_{14}O_5$, formed together with digitaligenin and grape sugar by the hydrolysis of digitalin Kiliani. (Kiliani, Archiv der Pharmazie 1892, p. 250, 1898, p. 2460.)

Digitalose Homolle-Quevenne is the component of digitalin Homolle which is soluble in a mixture of alcohol and ether, and insoluble in dilute alcohol. (Compare page 29.)

Digitalosmin was the name given by Walz to the odoriferous principle of Digitalis purpurea; he obtained it by steam distillation from the herb in the form of yellowish-white scales, which glisten like mother-of-pearl, soluble in alcohol or ether and in hot water. They bore a strong smell characteristic of dry digitalis leaves. (Jahrbuch für praktische Pharmazie 1852, Vol. 24, p. 86.)

Digitasolin was the name at first given by Walz to his digitalin. According to Wiggers, however, it is a constituent (compare Roscoe and Schorlemmer, Lehrbuch 1901, VI, p. 682) of (raw) digitalin Walz, which Walz subsequently divided into (what he called) true, pure digitalin, digitalicrin and digitalosin. He gave the melting point of his pure digitalin as 175° C., and the melting point of digitalosin as 137.5° C. (Compare Wiggers, Canstatt's Jahresberichte 1850, Vol. 10, p. 23.)

Digitin Nativelle was described by Nativelle as a crystalline substance, insoluble in water, which possessed neither taste nor physiological action. It was prepared by the author from digitalis leaves and cannot therefore be identified with digitin (Moniteur scientifique 1874, p. 822.)

Digitoflavone is a yellow pigment present in digitalis leaves; it forms crystals and is identical with luteolin. (Fleischer, Dissertation Freiburg 1898. Berichte der deutschen chemischen Gesellschaft Berlin 1899, p. 1184 and 1901, p. 1453.)

Digitogenin is a substance which has the formula $C_{30}H_{48}O_6$, or $C_{30}H_{50}O_6$, formed by hydrolysis from digitonin; it crystallises in fine needles and melts at a temperature above 250° C. Compare page 30. (Archiv. der Pharmazie 1892, p. 261 and 1893, p. 448.—Berichte der deutschen chemischen Gesellschaft Berlin 1890, p. 1555, 1891, p. 339 and 3951, 1899, p. 2201 1901, p. 3562.—Archiv für experimentelle Pathologie, Vol. 3, p. 24.)

Digitogenic acid, according to Kiliani, is an α-ketonic acid, and is formed by the oxidation of digitogenin by means of chromic acid. It is a dibasic acid of the formula $C_{28}H_{44}O_8$. (Berichte der deutschen chemischen Gesellschaft Berlin 1891, p. 343 and 1899, p. 2203.—Archiv der Pharmazie 1893, p. 448 and 1899, p. 466.)

β-Digitogenic acid, $C_{28}H_{44}O_8$, is formed by heating digitogenic acid to 160° C. Colorless crystals melting at 105° C.

(Kiliani, Archiv der Pharmazie 1899, p. 466.—Berichte der deutschen chemischen Gesellschaft Berlin 1899, p. 2205.)

Digitoleinic acid. Kosmann precipitated an aqueous extract of digitalis leaves with lead subacetate and treated the precipitate thus produced by warming with a solution of sodium carbonate. By treating the liquid with sulphuric acid, he was able to precipitate two substances; of these one soluble in ether was called by him digitoleinic acid. It forms a fatty, granular mass. (Journal de connaissance médicale 1845, Vol. 13, Buchner's Repertorium für Pharmazie 1846, Vol. 92, p. 348.)

Digitonein, according to Schmiedeberg, is a body formed by the decomposition of digitonin by means of hydrochloric acid; it is insoluble in ether. (Archiv für experimentelle Pathologie, Vol. 3, p. 22.)

Digitonin, when anhydrous, occurs as an amorphous body, while with $5H_2O$ it is a crystalline, chemically uniform body; its formula is $C_{54}H_{92}O_{28}$ or $C_{54}H_{92}O_{28} + 5H_2O$. (Compare page 30.)

Digitonin, amorphous, is digitonin Schmiedeberg.

Digitonin cryst. is digitonin Kiliani.

Digitonin Kiliani, is pure, crystalline, hydrated digitonin ($C_{54}H_{92}O_{28} + 5H_2O$). Archiv der Pharmazie 1893, p. 460.—Berichte der deutschen chemischen Gesellschaft Berlin 1891, p. 339 and 3951.)

Digitonin Schmiedeberg is amorphous, anhydrous digitonin ($C_{54}H_{92}O_{28}$). According to Kraft, digitonin Schmiedeberg and digitonin Kiliani are not identical; he therefore suggests the designation "digitsaponin" for digitonin Schmiedeberg. (Kraft, Schweizer Wochenschrift für Chemie und Pharmazie 1911, p. 175.)

Digitophyllin, according to Kiliani, is a chemically uniform body with the formula $C_{32}H_{52}O_{10}$. According to Keller, Arnaud and Adrian, it is identical with the French digitaline cristallisée. But neither the identity nor the dissimilarity of these two digitalis products has as yet been conclusively proved. (Archiv der Pharmazie 1897, Vol. 235, p. 426.—van Rijn, The glucosides 1900, p. 425.)

Digitoresin, according to Schmiedeberg, is a substance soluble in ether, formed by treating digitonin with hydrochloric acid.

(Compare above.) (Archiv für experimentelle Pathologie, Vol. 3, p. 22.)

Digitoic acid, $C_{26}H_{42}O_7$, melts at 210° C. It is formed, together with β-digitogenic acid, on heating digitogenic acid to 160° C., or by warming it with solution of caustic potash. (Edinger, Berichte der deutschen chemischen Gesellschaft Berlin 1899, p. 339.—Kiliani, Archiv der Pharmacie 1899, p. 466.—Berichte der deutschen chemischen Gesellschaft Berlin 1899, p. 2201.)

Digitoxigenin, $C_{22}H_{32}O_4$, is a product of decomposition of digitoxin. It is formed, together with a sugar, so-called digitoxose, by the treatment of digitoxin with alcoholic hydrochloric acid at ordinary temperature. Digitoxigenin crystallises in colorless crystals melting at about 230° C. (Archiv der Pharmazie 1895, p. 311 and 1896, p. 481.—Berichte der deutschen chemischen Gesellschaft Berlin 1899, p. 2197.)

Digitoxin (solubile) Cloetta, according to Cloetta, is an amorphous modification of digitoxin, and is only distinguished from the latter by the smaller size of its molecule and its greater solubility in water. Kiliani, however, is of the opinion that digitoxin Cloetta (digalen) is identical with digitalein. (Cloetta, Münchener medizinische Wochenschrift 1904, p. 1466 and 1906, p. 2281.—Kiliani, ibid. 1907, p. 886.—Chemisches Zentralblatt 1907, II, 83.—Merck's Report 1907, p. 88.)

Digitoxin, according to Schmiedeberg and Kiliani, is a chemically uniform substance, which is present in the leaves but not in the seeds of digitalis. Kiliani gave it the formula $C_{34}H_{54}O_{11}$. (Compare above.)

Digitoxin Kiliani
Digitoxin Schmiedeberg } are identical with digitoxin.

β-Digitoxin is digitoxin Kiliani
α-Digitoxin is digitoxin Schmiedeberg } both are identical.

(Archiv der Pharmazie 1895, p. 311 and 1896, p. 277 and 481.)

Digitoxine Pharmacopée française is essentially identical with digitoxin. The French Pharmacopœia requires, inter alia, that the preparation shall give a green color when dissolved in concentrated sulphuric acid, whereas commercial digitoxin gives a brown color on solution. It also requires incorrectly that the preparation shall not dissolve in benzol (benzene). As a matter of fact, however, digitoxin is soluble in benzol (C_6H_6)

and not in petroleum benzin (aether petrolei). The error of the French Pharmacopœia, therefore, is due to the faulty misleading translation of the German " Benzin " into " benzine,' which in French is equivalent to benzol.

Digitoxinic acid, $C_{34}H_{56}O_{12}$, occurs in the form of the sodium salt on heating digitoxin with alcoholic caustic soda. (Kiliani, Archiv der Pharmazie 1899, p. 466.—Berichte der deutschen chemischen Gesellschaft Berlin 1899, p. 2200.)

Digitoxonic acid, $C_6H_{12}O_5$, is obtained by the oxidation of digitoxose. (Berichte der deutschen chemischen Gesellschaft Berlin 1905, p. 4040, 1908, p. 656 and 1909, p. 2610.)

Digitoxose, $C_6H_{12}O_4$, is the sugar formed together with digitoxigenin in the hydrolysis of digitoxin. White crystals melting at 101° C. (Kiliani, Archiv der Pharmazie 1895, p. 311 and 1896, p. 486.—Berichte der deutschen chemischen Gesellschaft Berlin 1898, p. 2455; 1899, p. 2196; 1905, p. 4040.)

Digitsaponin is a designation suggested by Kraft for digitonin Schmiedeberg. (Schweizer Wochenschrift für Chemie und Pharmazie. 1911, p. 175.)

Digitic acid is obtained from digitogenic acid by oxidation with potassium permanganate. It crystallises in needles melting at 192° C., and, according to Kiliani, it has the formula $C_{20}H_{32}O_8$. (Kiliani, Berichte der deutschen chemischen Gesellschaft Berlin 1891, p. 346, and 1899, p. 339.—Archiv der pharmazie 1893, p. 448.)

Digic acid, $C_{16}H_{24}O_6$, is an amorphous acid, which can be obtained by oxidation of the mother-lye of digitic acid. (Kiliani, Archiv der Pharmazie 1894, p. 334.)

Dixgeninic acid, $C_{22}H_{34}O_5$, is obtained in the form of needle shaped crystals, melting at 225° C., by heating digitoxigenin with alcoholic solution of caustic soda. (Kiliani, Berichte der deutschen chemischen Gesellschaft Berlin 1899, p. 2198.)

Gitalin is a glucoside which was obtained by Kraft from digitalis leaves (compare p. 31); it is soluble in 600 parts of cold water. According to Schmiedeberg, it corresponds in strength in its physiological action to digitalinum verum. (Schweizer Wochenschrift für Chemie und Pharmazie 1911, p. 163.)

Gitalin hydrate is, according to Kraft, obtained from gitalin by dissolving the latter in 1½ parts of alcohol at ordinary temperature and adding ¾ of a part of water. It separates in crystals. (Compare also gitalin p. 31.) (Schweizer Wochenschrift für Chemie und Pharmazie 1911, p. 162.)

Glucodigitalins was the name given by Ludwig to those preparations of digitalis, which were proved to have the characteristics of glucosides, in contradistinction to acrodigitalins (which see). Archiv der Pharmazie, Vol. 194, p. 213.

Hydrodigitoic acid, $C_{26}H_{44}O_6$, is formed together with digitoic acid by heating digitogenic acid with solution of caustic potash. It softens at 240° C. (Archiv der Pharmazie 1893, p. 457.—Berichte der deutschen chemischen Gesellschaft Berlin 1899, p. 339.)

Oxydigitogenic acid, $C_{28}H_{42}O_9$, is obtained from digitogenin by oxidation with potassium permanganate in alkaline solution. (Kiliani, Berichte der deutschen chemischen Gesellschaft Berlin 1891, p. 345, and 1899, p. 2205.)

Paradigitogenin is formed under special conditions during the hydrolysis of digitonin. (Archiv für experimentelle Pathologie 1875, Vol. 3, p. 25.)

Pseudodigitoxin is the name given by Burmann to a soluble glucoside, similar to gitalin, and obtained from digitalis leaves. (Schweizer Wochenschrift für Chemie und Pharmazie 1911, p. 33.)

Substance cristallisée inerte (Nativelle) is identical with digitin Nativelle.

Toxigenon, $C_{20}H_{26}O_3$ or $C_{19}H_{24}O_3$, is a crystalline body, formed by the oxidation of digitaligenin or of anhydro-digitoxigenin by means of chromic acid; it commences to decompose at 220° C., without melting. (Kiliani, Berichte der deutschen chemischen Gesellschaft Berlin 1898, p. 2459; 1899, p. 2199.)

Toxiresin is, according to Schmiedeberg, a product of decomposition of digitoxin, soluble in ether. (Archiv für experimentelle Pathologie 1875, Vol. 3, p. 39, and Vol. 4, p. 191.)

Various color reactions have been suggested for the chemical identification of the digitalis glucosides; some of these have gained full recognition in laboratory work, but most of them cannot be considered conclusive without the aid of biological tests. The first fairly characteristic reaction was already discovered by Homolle.[17] He found that his digitalin gave an intense green coloration with concentrated hydrochloric acid. To which constituent of digitalin Homolle this coloration is due is uncertain; it may, however, be pointed out that among the digitalis glucosides which have since been studied in detail the only one which gives this reaction is digitoxin. Digitalinum verum is colored yellow by hydrochloric acid, digitonin remains colorless and on heating with this acid it becomes red.

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[17] Homolle, Union médicale 1872, p. 205.

Later on Homolle's reaction underwent several modifications, some of which were quite unnecessary, with the intention of rendering it more characteristic. Thus Jorissen[18] used a solution of 1 gramme of zinc chloride in 30 grammes of water and 30 grammes of hydrochloric acid. As might have been expected, it gave a green color with digitalin.[19] The second part of Jorissen's reaction, namely that digitalin when evaporated with the zinc chloride solution mentioned above assumes a brown or black color, cannot be considered characteristic for digitalin, even though Czumpelitz[20] attributes the chestnut-brown color obtained on evaporating to dryness to be due to the condensing action of the zinc chloride. O. Pape[21] varied Homolle's reaction by mixing digitalin[19] with ten times the amount of starch, adding sufficient concentrated sulphuric acid to form a thick paste and then diluting with hydrochloric or nitric acid. The starch is said to be colored green by this method. Lafon[22] heated digitalin[19] with a mixture of alcohol and sulphuric acid (1:1) until it became yellow and then added a drop of very dilute iron chloride solution. This also gave a green color. This color is probably produced by all mineral acids under suitable conditions, and also by sulphuric acid, provided it is not masked by secondary reactions giving dark colored or black products, or by the brown coloration resulting from its mixture with the red digitalin reaction described below. Flückiger[23] modifies the test as follows: he concentrated phosphoric acid (25 p.c.) by heating on a watch glass, and added digitalin Nativelle to the warm acid. The digitalin was colored green and the acid yellow. The mechanism of the green coloration has not yet been explained.

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[18] Jorissen, Chemisches Zentralblatt 1880, p. 376.

[19] This must be a French digitalin, such as digitalin Homolle, digitalin Nativelle, or digitalin amorph. Gallicum, for digitalinum verum never gives a green coloration.

[20] Czumpelitz, Pharmazeutische Post 1881, p. 47.

[21] Pape, Archiv der Pharmazie, 1876, p. 233.

[22] Lafon, Comptes rendus de l'académie des sciences Vol. 100, p. 1463. — Bulletin de la société chimique Vol. 44, p. 18.

[23] Flückiger, Neues Jahrbuch der Pharmazie Vol. 39, p. 129.

While digitoxin produces a green coloration with concentrated hydrochloric acid, it causes a greenish-brown to brown color with concentrated, pure sulphuric acid. Digitalinum verum, on the other hand, is only colored yellow by sulphuric acid. But if the sulphuric acid contains oxidizing substances, such as iron oxide or nitric acid, it yields a deep red color with digitalinum verum. For this reason Grandeau[24] also used bromine with the sulphuric acid for the digitalin reaction, by exposing the solution of digitalin in sulphuric acid to the action of bromine vapor. In carrying out this reaction a violet-red color is obtained. Buckingham[25] used a solution of molybdic acid in sulphuric acid, which yields a crimson color with digitalin. Kiliani[26] describes a digitalin reaction similar to Grandeau's which is probably characteristic of digitalinum verum. If a little digitalinum verum is dissolved in sulphuric acid and a drop of very dilute nitric acid, iron chloride solution, or bromine is added, a bluish-red color is produced, similar to the color of digitalis flowers, which soon disappears. The touch of blue in the red coloration has always been considered of special value.

Keller[27] gives the following reactions for the digitalis glucosides. The glucoside is dissolved in 4 c.c. of glacial acetic acid, one drop of a dilute solution of iron chloride is added and the mixture is layered on to 4 c.c. of sulphuric acid. A colored ring appears at the junction of the liquids. Digitonin gives a pale pink color, which soon disappears. Digitalinum (verum) gives rise to a carmine ring, still plainly visible as a permanent violet-red color if only 0.05 milligramme of digitalin is present in 1 c.c. of glacial acetic acid. Digitalein gives a similar coloration, but it is rather fainter and not so constant. Digitoxin at first gives a dirty greenish-brown color, but very soon the uppermost layer of the sulphuric acid is seen to become brownish-red, while above it a broad, deep bluish-green band is formed, the color of which soon passes into a permanent indigo-blue. While the mechanism of the green color reaction of digitoxin cannot be explained, the blue coloration is probably due to the splitting up of the digitoxin, by which digitoxose is formed. This latter most probably causes the blue ring, for Kiliani [28] has found that digitoxose yields a blue color when dissolved in acetic acid containing iron oxide and sulphuric acid.

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[24] Grandeau, Comptes rendus de l'académie des sciences 1864, Vol. 58, p. 1120.

[25] Buckingham, American Journal of Pharmacy 1873, p. 149.

[26] Kiliani, Archiv der Pharmazie, Vol. 230, p. 250.

[27] Keller, Berichte der pharmazeutischen Gesellschaft Berlin 1895, p. 275.

In analytical practice, the following reaction for the three most important digitalis glucosides have been extensively adopted, being founded on the observations detailed above:

Digitalinum verum (and digitalinum Germanicum) dissolves in pure concentrated hydrochloric acid, or sulphuric acid, giving a yellow color. If a drop of dilute ferric chloride solution is added to the solution in sulphuric acid, a red color containing a touch of blue is immediately produced; the depth of the red coloration varies according to the amount of digitalin present, and it remains constant for days. This coloration is most probably due to digitaligenin, a product of decomposition of digitalin. If sulphuric acid containing iron oxide is used for this reaction, a yellow coloration often appears at first, which lasts for a short time and very soon changes to red. Digitonin is not altered by a similar test; digitoxin is colored a dirty greenish-brown or brown.

Digitoxin is most easily recognized by Keller's reaction described above; it may also be carried out in the following modification. To 100 c.c. of concentrated sulphuric acid about 1 c.c. of a 5 p.c. aqueous solution of ferric sulphate is added, while a mixture of 1 c.c. of the same ferric sulphate solution with 100 c.c. of glacial acetic acid is also prepared. If now a trace of digitoxin is dissolved in about 5 c.c. of this glacial acetic acid containing iron oxide, and this solution is layered on to 5 c.c. of the sulphuric acid containing iron oxide, the coloration, especially the bluish-green band, will become more evident. The green coloration referred to above, formed by the action of concentrated hydrochloric acid on the glucoside, is also characteristic of digitoxin.

Digitonin is not colored either by hydrochloric acid or by sulphuric acid in the cold. On boiling with hydrochloric acid, or with sulphuric acid which is not too dilute, a red solution results the intensity of which gradually increases. (Compare Cloetta, Archiv für experimentelle Pathologie 1901, Vol. 45, p. 435.)

The reactions given above suffice as a means of identification for pharmaceutical purposes; they are not conclusive for forensic purposes. In this case a biological examination is absolutely necessary.

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[28] Kiliani, Berichte der deutschen chemischen Gesellschaft Berlin 1898, p. 2454.

Besides the qualitative tests, the quantitative estimation of digitalis gluocosides in digitalis leaves is of more general interest. So far the estimation of digitoxin, as worked out by Keller, is the only one deserving of consideration. It can be applied in a slightly modified form in the following way.

28 grammes of air-dried, powdered digitalis leaves are placed in a suitable glass-stoppered flask of 500 c.c. capacity; over these are poured 280 grammes of alcohol 60 p.c. (by weight) and the mixture is left to stand for 3 to 4 hours, shaking it frequently. It is then filtered and 207 grammes of the filtrate are evaporated to about 25 grammes on a water-bath. Sufficient water is added to the residue to bring the total weight to 222 grammes, and while stirring, 25 grammes of official liq. plumbi subacetatis fort. are added. The mixture is immediately filtered and to 132 grammes of the filtrate, in an Erlenmeyer flask, a solution of 5 grammes of sodium sulphate in 8 grammes of water is added. When the precipitate has settled, 130 grammes of the clear fluid are poured into a separator, 2 grammes of solution of ammonia (10 p.c. NH_3) are added and the mixture is shaken 5 times, each time with 30 c.c. of chloroform. The chloroformic solutions are filtered and then evaporated, the dry residue is dissolved in 3 grammes of chloroform, and, in order to precipitate the digitoxin, 7 grammes of ether and 50 grammes of petroleum ether are added. The flocculent digitoxin which separates is collected on a small filter (5 cm. diameter) and dissolved on the filter by the addition of hot absolute alcohol. The alcoholic solution which runs through is collected in a glass capsule, evaporated to dryness and the residue dried until the weight is constant. This multiplied by 10 gives the percentage of digitoxin contained in the leaves analysed. But, according to J. Burmann,[29] this so-called digitoxin is pseudodigitoxin, for in contradistinction to true digitoxin it is amorphous and soluble in water and ether. Kraft[30] declares that the product obtained by Keller's method consists chiefly of gitalin (or gitalin hydrate and anhydrogitalin, in addition to digitoxin. He agrees with Burmann in that he also considers Keller's digitoxin to contain only a very small amount of digitoxin.

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[29] Burmann, Bulletin de la société chimique 1910, p. 973. — Chemiker-Zeitung 1911, Repert, p. 31.

[30] Kraft, Schweizer Wochenschrift für Chemie und Pharmazie 1911, p. 174.

BOOK REVIEW.

YEAR-BOOK OF PHARMACY AND TRANSACTIONS OF THE PHARMACEUTICAL CONFERENCE, 1912.—This volume of nearly 700 octavo pages comprises abstracts of papers relating to Pharmacy, Materia Medica and Chemistry contributed to British and foreign journals from July 1, 1911, to June 30, 1912, with the transactions of the British Pharmaceutical Conference at the forty-ninth annual meeting held in Edinburgh, July, 1912. The editors and abstractors are to be congratulated on the promptness with which the volume under discussion was published and are to be commended for the completeness and comprehensiveness of the abstracts contained in the nearly 400 pages devoted to this portion of the book.

Following an interesting review of the more important happenings in the sciences related to pharmacy, the abstracts are arranged under the general headings, Chemistry, Materia Medica and Pharmacy, as follows:—Chemistry; alkaloids; animal products; clinical tests; coloring matters; essential oils; fats, fixed oils and waxes; glucosides, sugars, and ferments; gums, oleoresins, and resins; inorganic chemistry; organic chemistry, unclassified; plant analysis: Materia medica; new remedies; pharmacognosy; pharmacology and therapeutics: Pharmacy; dispensing; galenical pharmacy; pharmacopœia revision notes; notes and formulas. This arrangement of the abstracts readily facilitates a critical and comparative study of the progress made in any one branch of pharmaceutical research during the year and also facilitates reference by permitting the juxtaposition of abstracts of closely related articles.

The succinct and yet complete reflection of the transactions of the British Pharmaceutical Conference at its annual meeting, Edinburgh, 1912, is particularly interesting from a practical point of view in that it tends to preserve for future generations of pharmacists an accurate account of the activities of the association.

An index covering 45, double column, pages completes the volume and makes it doubly valuable as a book of reference. Altogether there can be no gainsaying the opinion that the Year-Book for 1912 is a valuable contribution to the literature of pharmacy and that the thanks of pharmacists throughout the English speaking world are due to the members of the British Pharmaceutical Conference particularly for the continuance of this increasingly interesting annual publication. M. I. W.

DR. ALSBERG, THE NEW CHIEF OF THE BUREAU OF CHEMISTRY.

Dr. Carl L. Alsberg, chemical biologist of the Bureau of Plant Industry, U. S. Department of Agriculture, has been appointed chief of the Bureau of Chemistry by President Taft in succession to Dr. Harvey W. Wiley. Dr. Alsberg was born in New York City and is a graduate of Columbia University. He studied abroad at a number of the leading universities, including the University of Berlin, where he did considerable work under Professor Schmiedeburg, the eminent Pharmacologist. Upon his return from Germany he became head of the Department of Biological Chemistry of the Harvard Medical School, and from tnat post entered the Government service. He is a member and ex-Secretary of the Council of Boston Society of Medical Sciences, councillor of the American Chemical Society, Chairman of a section of Biological Chemistry of the American Chemical Society, associate editor of Chemical Abstracts, collaborator of the Journal of Pharmacology and Experimental Therapeutics, and is the author of a long list of scientific papers in both German and English.

In an interview in the *Public Ledger* of December 22, 1912, Dr. Alsberg, while very modest and conservative, yet gives the assurance of recognizing the responsibilities of his position not only to the public but to the manufacturer. He says:

"I believe that most manufacturers and handlers of foodstuffs want to do the right thing, but most of them don't know exactly what is the right thing. The whole subject of food inspection and the demand for pure foods is new. When the Bureau of Chemistry was established there were no standards, no guides of any sort. Everything had to be worked out, and it's been slow work. Only a few things definitely have been determined for this analysis of foods. To establish standards is not the work of days, but of years. When we arrive at what is the standard then we must show the manufacturer how to bring his products up to the standard.

"If we tell a man who is putting up dried fruit that he must not use certain preservatives to prevent the development of insect life in the product, we have gone only half way if we do not show him how he can take care of his fruit in such way as to dispense with the forbidden preservative and still insure the keeping qualities of the product."

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FEBRUARY, 1913

WHAT IS TERRA ALBA?

By Charles H. LaWall.

For many years previous to the passage of the Federal Food and Drug Act of June 30, 1906, the substance terra alba had been associated with confectionery in the sense of its being an adulterant and cheapener. In the popular mind as well as among chemists it conveyed the impression of a white, insoluble and tasteless earthy substance (terra alba L., white earth) which could be used as a filler and cheapener in candy. Where the idea of the prevalence of its use originated it would be difficult to say. It may be true that it was occasionally used by unscrupulous manufacturers, just the same as sugar may have been adulterated with sand by some grocers, but so far as any authenticated instances of either of these forms of adulteration having been detected by any person of authority, who afterward made a record of the fact, they are conspicuous by their absence in the literature of foods and food adulteration.

In the Federal Act before mentioned terra alba is one of the several adulterants which are specifically prohibited by name in the following clause:

> "An article of food shall be deemed to be adulterated, in the case of confectionery, if it contain terra alba, barytes, talc, chrome yellow, or other mineral substances."

This specific prohibition of terra alba by name is also found in the State laws of Alabama, Arkansas, California, Colorado, Connecticut, Florida, Georgia, Idaho, Illinois, Iowa, Kansas, Louisiana, Maine, Maryland, Minnesota, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Virginia, Washington and Wyoming. No interpretation of this clause or ruling in which these substances are specifically defined could be found in any of the foregoing instances.

One would naturally suppose that the identity of a substance which is referred to by name in so many laws could be easily established by referring to chemical authorities or general works of reference, but such is not the case.

I recently had the question put to me directly "What is terra alba?" and having answered it in my own mind, off hand, as being powdered gypsum, I set about confirming this opinion and soon found it no easy task, for not only did I find that a large number of authorities make no mention at all of the substance in their indexes, but I found, what was still more disconcerting, that those who did mention it and attempted to define it, did not agree as to its identity.

The first authority I turned to was Wiley, "Foods and Their Adulteration," 1906, where it is defined as being talc. This is the only authority of the many consulted by whom talc is mentioned as a synonym for terra alba and this is probably an error or the two substances would not be mentioned separately in the clause quoted from the Federal Act.

The Century Dictionary (1906 and 1912) gives pipe clay as a synonym. This same statement is made in Gould's Medical Dictionary, 1908, in the Standard Dictionary, 1902, and in Lippincott's Medical Dictionary (Cattell), 1910. White clay is the synonym given in Dorland's American Illustrated Medical Dictionary, 1906, and in the National Dispensatory, 1908.

Gypsum is given as the synonym for terra alba in Thorpe's Outlines of Industrial Chemistry, in Allen's Commercial Organic Analysis, Vol. I, under Paper, 1910, in Bartley's Medical Chemistry, 1900, and in Witthaus' Chemistry, 1890.

In Kraemer's Pharmacognosy, 1910, the statement is made that terra alba is a compound of alumina, silica and magnesia. Merck's Index for 1907 (a price list) gives kaolin as being identical with terra alba.

In the hope that some light might be shed upon the subject in connection with the classification of chemical substances for the tariff, a letter was addressed to the U. S. Treasury Department asking for a definition of terra alba. In reply, the Bulletin of the Treasury Department, issued in 1909, was received, attention being directed to the following paragraph, No. 693, "Terra alba not made from gypsum or plaster rock."

In Bulletin No. 13, issued by the U. S. Department of Agriculture in 1892, upon the subject of confectionery, the only mention of the substance is in the following sentence, referring to insoluble substances looked for in the 250 samples examined (but not found): "Terra alba, kaolin or other mineral substances."

By this time I had come to the conclusion that terra alba is a substance differing in its identity according to the particular industry in or purpose for which it is used and a search was commenced for some one authority who would recognize and record this fact. I was astonished to find the large number of books on chemistry, etc., and works of reference in which no mention whatever is made of terra alba in the indexes. These books included the following:

British Pharm. Codex, 1907.
U. S. Dispensatory, 19th ed., 1907.
King's American Dispensatory, 1859.
Arny's Principles of Pharmacy, 1909.
Remington's Practice of Pharmacy, 4th ed., 1906.
Hager's Pharmaceutical Praxis, 1907.
Parrish's Practice of Pharmacy, 1874.
Sadtler and Coblentz, Text Book of Chemistry, 1907.
Attfield's Chemistry, 1890.
Alex. Smith's General Inorganic Chemistry, 1906.
Wagner's Chemical Technology, 1904.
Thorpe's Dictionary of Chemistry.
Watts' Dictionary of Chemistry.
Sadtler's Industrial Organic Chemistry, 1912.
Molinari's Industrial Inorganic Chemistry, 1912.
Encyclopedia Britannica, 1911.
Johnson's Dictionary, 1877.
Worcester's Dictionary, 1894.
Ure's Dictionary of Arts, Manufactures, etc., 1860.
Spon's Encyclopedia of Industries, Arts and Manufactures, 1879.
Food Inspection and Analysis, Leach, 1904.
Koenig's Nahrung und Genussmittel, 1889.

This list of authorities and works of reference is by no means complete, but it illustrates the range of the search, which included every book that might possibly contain a reference to the subject.

At last two references were found in support of the view previously mentioned, that terra alba is not one but a number of substances. In the 21st annual report of the Connecticut Agricultural Experiment Station for 1897, page 34, was found the following statement in connection with the examination of some samples of confectionery (where again, no evidence of its presence was found in a number of samples examined): "Terra alba, literally signifying white earth, is a trade name for some cheap, tasteless and flavorless white substance in powder, which can be used as a make-weight adulterant. Pipe clay and gypsum are commonly sold under this name." The foregoing reference is not nearly so available nor so complete, however, as the following from Webster's International Dictionary, 1900:

"Terra alba (L. white earth) (Com.), a white, amorphous, earthy substance consisting of burnt gypsum, aluminum silicate (kaolin), or some similar ingredient, as magnesia. It is sometimes used to adulterate certain foods, spices, candies, paints, etc."

The later edition of the same authority (1910) gives practically the same information in a slightly different form, as follows:

"Any one of several white amorphous substances; as (*a*) gypsum, ground for pigment, (*b*) kaolin, used especially as an adulterant of paints, etc., (*c*) burnt alum, (*d*) magnesia."

The foregoing facts will probably be of interest to many who have already met or will at some time in the future meet this query. The variations and inconsistencies recorded in connection with the search illustrate the carelessness or incompleteness, or both, with which many works of reference are compiled.

The possibilities are almost infinite for a shrewd lawyer to take advantage of these differences and interpose technicalities as to the identity of the substance terra alba in a case where its presence is made the basis of a prosecution for adulteration. It would seem to be preferable to follow the example of the Pennsylvania State law in which the prohibition is made equally emphatic by the use of the general term "mineral substances."

THE RESINS AND THEIR CHEMICAL RELATIONS TO THE TERPENES.[1]

By George B. Frankforter.[2]

The closing years of the eighteenth and the beginning of the nineteenth centuries found chemists engaged in the study of chemical problems related to both plant and animal life. Organic chemistry during this early chemical epoch was exactly what its name implied, a study of those substances which are produced through life processes, either plant or animal. During this early epoch, the problems in plant chemistry were more inviting to the chemist than those in animal life, first, because the compounds appeared to be simpler substances and, second, because they crystallized more readily and were therefore more readily obtained in pure form. As a result of these characteristics, early organic chemistry was largely confined to plant life, consisting, however, of little more than the simple preparation of the substances themselves.

Scheele was the first to point out that the plant and animal world is made up of definite compounds, just as is the inorganic world. He proved the assertion by isolating a number of organic substances, among them tartaric, citric, malic and uric acids. He even went so far in his study of the organic compounds as to suggest what the modern physiological chemist calls metabolism, as a means of explaining certain physiological processes. Owing, however, to the extreme difficulty in obtaining physiological compounds in crystalline form, Scheele devoted much time to phytochemistry, discovering more than a score of important plant compounds besides those mentioned above. Other men followed in his footsteps and by the beginning of the last century many of the important plant compounds had been isolated.

At the very beginning of what may be justly called the renaissance in organic chemistry, Marggraf (1745–79) completed his historical work on the common beet-root. With his discovery and preparation of sucrose from the sugar-beet began the first and perhaps the greatest and most highly technical industry of modern times. It was likewise during the close of this first epoch that Pelletier began his classical work on the alkaloids, resulting in the discovery of no less than twelve of the important ones, including quinine, strychnine, and brucine. In fact, it was during this same epoch that nearly all of the great families of plants were studied from the chemical point of view, resulting, in almost every case, in important discoveries. Even the resins, which chemists have until recently regarded as too complex to deserve serious attention, were studied in an industrial way and more than thirty different varieties prepared and used in the arts. But the resins were only one of the many groups of organic compounds regarded as too complex to admit of other than a study in the most general way, for organic chemistry had not advanced far enough to permit of a thorough chemical study of even the simplest of the organic substances. The adoption of the radical and the ring theories about the middle of the last century, however, completely changed the sphere of organic chemistry and synthetic methods and the chemical constitution of organic compounds became the goal toward which a large majority of chemists worked.

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[1] Reprinted from *Science*, N. S., Vol. XXXVI, No. 922, Pages 257–263, August 30, 1912.

[2] A part of the address of the vice-president and chairman of Section C, American Association for the Advancement of Science, Washington, December, 1911.

The adoption of the benzene ring theory, together with the working out of the chemical constitution of naphthalene, pyridine, quinoline and the terpenes, opened new fields in phytochemistry, and the first ten years of labor after the adoption of these new theories showed amazing results.

Structural and synthetic work in plant chemistry really began in the sixties. In 1869, Lieberman startled the whole chemical world by synthesizing alizarine, an important vegetable dye-stuff, and shortly after the alizarine synthesis, Baeyer succeeded in building up the indigo molecule.

Following these historical discoveries came numerous pyhtochemical syntheses, one of the most important being the artificial preparation of vanillin. Until Tiemann had shown that vanillin can be made cheaper in the laboratory than it can possibly be obtained from the vanilla plant, chemists, on the whole, were somewhat skeptical about the practicability of synthetic methods and especially as to the possibility of these synthetic compounds supplanting those produced by nature. The vanillin and the indigo syntheses, however, completely changed the whole chemical world in this respect. Men began to imitate nature in the building up of not only the vegetable, but also the simple animal compounds —a few enthusiasts casting longing glances at the constitutional formulæ of sugar, starch and cellulose, while the ultrachemical investigators dared even to speak in undertones of the structure of the albumins and the resins. Then came Baeyer's marvellous work on mellitic acid. His exhaustive study of this acid, which began as early as 1867, was so far reaching in its application to the ring compounds that it had much to do with final working out of the structural constitution of the terpene group.

There is a universal feeling, I think, among those who have watched the development of organic chemistry during the last twenty years, and especially along phytochemical lines, that in the not distant future all of the more important plant compounds will have been products of the laboratory. That there is ground for such a statement is borne out by what has already been done. The investigations of Loew, Butleroff, Kiliani, Emil Fischer, and Wohl on the carbohydrates are so familiar to every one that it is only necessary to briefly refer to them at this time. The aldehyde condensation reaction by Loew and Butleroff, the building up of the sugars by Kiliani and the down-building by Wohl make the synthesis of the hexoses an established fact and the synthesis of the bioses at least a possibility in the near future.

The briefest phyto-synthetic review would be incomplete without referring to the most recent work of Emil Fischer and his pupils on the so-called polypeptides. Here is a group of complex substances belonging to the albumins of both the plant and the animal world, a group of compounds whose synthesis has, until recently, been regarded by many as beyond human possibility. Nevertheless, Fischer has built up the complex polypeptides until the artificial molecules are equal in size to the albumins themselves, leaving the synthesis of these complex chemical substances no longer in the list of vain possibilities.

Of scarcely less importance in the phytochemical world than the carbohydrates, the alkaloids and the albumins, are the resins and terpenes. Wallach has presented a satisfactory constitutional formula for pinene, but the resins are still classed with substances of unknown constitution. Notwithstanding the fact that less is known concerning the chemical nature of the resins than perhaps any other group of organic compounds, they are doubtless the oldest organic compounds known to man. They played an important part in the chemical industries in the early history of mankind. They were used in almost every phase of early human life, as lacs, varnishes, balsams, perfumes, pomades and in the art of embalming. They were described by the early alchemists as substances insoluble in water, generally soluble in alcohol, and for the most part non-crystallizable. They are the result of secretive plant fluids, exuding from the plants and hardening in the air. They could not be separated into their constituents by any means known to the early chemists, and were therefore regarded as single substances. As a rule, however, they are mixtures of two or more complex substances, a gum and some volatile oil or terpene. They were known as gum resins or natural balsams and with the terpenes as oleoresins. As a result of their non-crystalline nature they were generally excluded from the list of substances worthy of investigation.

That there is a close chemical relationship between the resins and the terpenes, there can be no doubt, notwithstanding the fact that there is comparatively little experimental evidence to prove the assertion. One of the reasons usually given for the assumption is based on the fact that the resins and terpenes generally occur together in plants. This is by no means important evidence, for it frequently happens that entirely different groups of organic compounds are intimately associated with each other in both plant and animal life.

Notwithstanding the fact that considerable general industrial work has been done on the resins, especially those of the pine family, yet no one has been able to determine with certainty the molecular constitution of any of them, not even of abietic acid, the most common and the most important of all of the resin acids. Not only are the structural formulæ unknown, but in most cases the empirical formulæ are still in doubt. For instance, the formula for abietic acid has been generally accepted as $C_{20}H_{30}O_2$, but Mach in his dissertation on the acid gave to it the formula $C_{19}H_{28}O_2$. Absolutely nothing is known of its chemical constitution.

Various theories have been advanced concerning the relationship between the resins and terpenes. What evidence there is may be briefly stated. The fact that the aldehydes in the presence of alkalies change to resinous matter was presented by Wiesner in what may be called the reduction theory. Wiesner[3] assumed that the resins are formed from the carbohydrates, or, speaking more specifically, from the starches by a process of polymerization and reduction. It is perfectly evident that Wiesner's theory is not applicable in all cases. The pine family, for instance, contains a minimum amount of starch, yet it is the richest of the resinous species. Wiesner was aware of this fact and assumed that in the case of the pine family the resins were formed through the action of gallic and gallo-tannic acids.

While the starch theory has certain facts in its favor, there are, on the contrary, serious objections to it. It would seem not only strange, but also diametrically opposed to general chemical laws, that plants should proceed to build up the complex starch molecule and then break it down again into the resin and finally into the terpene molecule. Of course, it must not be forgotten that the sugars belong to the aldehydes and tend to form resinous substances when treated with alkalies. They are, however, by no means as readily converted into the resins as the simpler aldehydes. One would naturally expect that if the resins are formed by the aldehyde reaction they would proceed from the simple rather than from the complex aldehydes or sugars.

One of the first comprehensive works on the formation of the resins from the aldehydes was presented by Baeyer. He obtained several synthetic resins by the aldehyde condensation reaction, but an examination showed that they were unlike any of the resins found in nature. In each case the molecule seemed to be extremely complex and no attempts were made to determine the structure or the size of the molecule. Kronstein, following out the work which Baeyer had begun, presented constitutional formulæ for these aldehyde resins in a very unique but entirely empirical way. He assumed the resin molecule to be a complex benzene ring or perhaps several superimposed rings joined with either hydrocarbon, methoxyl, ethoxyl or carboxyl radicles, and gave the graphic formulæ for them. Of course such structural formulæ are interesting, but needless to say they are not based on experimental data.

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[3] *Centr.*, 1865, p. 756.

In the starch explanations of the formation of the resins in plants, it must be assumed that the resins are formed by first building up the complex starch molecules from the simpler aldehydes, and then breaking them down again into the resins and terpenes. So far as can be ascertained there are no experimental data in favor of this theory. If, on the contrary, we assume that the resins are built up from the simple aldehydes, the process is more logical, as it only requires two steps, namely, polymerization and reduction, instead of three distinct steps as indicated in the following simple diagram:

$$\begin{tikzcd} & \text{Starch} \arrow[dr] & & \\ \text{Aldehydes} \arrow[ur] \arrow[rr] & & \text{Resin} \arrow[r] & \text{Terpenes} \\ \text{(Formaldehyde)} & & & \end{tikzcd}$$

While the above theories have many points in their favor, there is another which, while it may have some objections, has at the same time decided advantages over the starch or reduction theory.

It is common knowledge that the terpenes, when exposed to air, slowly change to complex polymers and resins of unknown composition. The principle involved is doubtless condensation followed by oxidation. Wöhler was the first to suggest that the resins may be built from the terpenes by the above-mentioned condensation and oxidation process. He based his assumption on the well-known fact that turpentine absorbs oxygen, forming a resin. This oxidation process may be represented by the following equation:

$$2C_{10}H_{16} + 3O = C_{20}H_{30}O_2 + H_2O.$$

Wöhler, unfortunately, presented no experimental data. Later, Cailliots obtained a resin by the oxidation of turpentine with nitric acid. It was not well defined, however, and not identical with any of the common resins, although it bore some semblance of common pine resin.

Barth[4] obtained, by oxidizing oil of lavender, a terpene, an amorphous resin which he carefully studied and gave the formula $C_{20}H_{30}O_3$, apparently an oxyabietic acid.

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[4] *Ann.*, 143-313.

Heldt,[5] in an exhaustive study of the resins, produced common sylvic acid by oxidizing a polymerized form of turpentine according to the following equation:

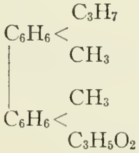
$$2(C_{10}H_{16}) \text{ or } C_{20}H_{32} + O_2 = C_{20}H_{32}O_2, \text{ sylvic acid,}$$

and

$$C_{20}H_{32}O_2 + O = C_{20}H_{30}O_2 + H_2O, \text{ or abietic acid.}$$

This work has been repeated, but without obtaining either sylvic or abietic acids.

One of the most interesting communications along this line was presented by Bruylant. He obtained, by a method not given, a polymer of pinene which he represented as a condensation of two molecules of pinene or dipinene. By oxidizing this substance he obtained an acid which had the empirical formula for abietic acid:



$$\begin{array}{l} C_6H_6 < \begin{matrix} C_3H_7 \\ CH_3 \end{matrix} \\ | \\ C_6H_6 < \begin{matrix} CH_3 \\ C_3H_5O_2 \end{matrix} \end{array}$$

No details of the work, however, were given.

Work on the condensation of the terpenes has been in progress at the University of Minnesota for several years. Before describing some of these experiments, however, it may be of interest to briefly trace the work on the synthesis of the terpenes themselves. It was observed early in this work that when pinacone is treated with bromine, an extremely complex reaction takes place and among the products formed are isopropyl alcohol and substances belonging to the terpenes. It was found, however, on carefully studying the reaction, that Baeyer had already observed this fact, but had not followed out the reaction, doubtless on account of the extreme complexity of the reaction. If, however, we take into consideration these two substances, the reaction may be represented as follows:

$$6C_6H_{14}O_2 = 2C_3H_8O + 3C_{10}H_{16} + 10H_2O.$$

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[5] *Ann.*, 63–48.

Some time previous to this work, Kondakow[6] in his work on angelic and tiglic acids obtained from them a hydrocarbon which proved to be a methyl derivative of crotonylene. It had the general formula for the hemiterpenes. From the description it seems quite likely that this hydrocarbon is related to the terpenes, for it has the formula $CH_3 = C(CH_3) - CH = CH_2$, which is identical with the hemiterpene, isoprene.[7] Now, angelic and tiglic acids are comparatively common in the plant world and if, as Kondakow states, these hydrocarbons are readily obtained from the acids, then it is possible that the hemiterpenes are formed in this way and by the condensation of two molecules of the hemiterpenes, a terpene in this particular case, camphene, is formed according to the following simple equation:

$$2C_5H_8 = C_{10}H_{16}.$$

In pursuing the work of the terpene polymerization, practically all of the methods in the terpene literature were tried. All of them, however, were unsatisfactory. It was noticed in previous work on the chlorhydrochlorides[8] of terpenes, that in the preparation of the hydrochloride on a large scale there was always left a considerable portion of material of thick oil consistency after the chloride had been removed. Examination showed that this oil contained a small quantity of resinous matter. After unsatisfactory attempts to isolate the resin, other agents were tried. Bromine and iodine were tried and each was found to produce resins more readily than chlorine. As iodine gave best results, it was used in the experimental work which follows. It was found, first of all, that iodides somewhat similar to the chlorhydrochlorides could be formed, especially if the reaction took place in sunlight. These iodides were first isolated and studied. The di-iodide proved to be of special interest. When pure it is a heavy colorless oil with a slight camphoraceous odor. When exposed to sunlight it readily decomposes, liberating iodine and resins, notwithstanding the fact that sunlight seems to play an important part in its formation. If exposed to sunlight for some time the iodine is all liberated and there is left a resinous mass composed chiefly of two substances. This resinous mass was subjected to distillation in vacuo. The distillate obtained was a thick, colorless, stable oil. Its molecular weight indicated a dipinene. It contained no iodine, and from its remarkable stability it is probable that the pinene radicles are doubly joined to each other. By oxidation it forms an acid isomeric with abietic acid. The residue left in the flask after the dipinene had been removed was also of unusual interest. It proved to be a solid of a light amber color. It had exactly the same melting point of ordinary rosin. Most of its properties were also identical with those of common rosin. It proved to be a tetra pinene, and, owing to its close resemblance to ordinary colophonium, it has been called colophonene.

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[6] *Jour. of the Russ. Phys. Chem. Soc.*, 1891, I., 178.

[7] It may be interesting to the reader to note that isoprene has very recently been polymerized to India rubber.

[8] *Jour. Am. Chem. Soc.*, 28, p. 1461.

These two condensed forms, the di- and the tetra-pinene compounds, have been isolated and carefully studied. Both are stable, but may be oxidized to acids with many of the characteristics of the resin acids. A comparison of these synthetic compounds with the natural resins is both interesting and important. Those which have been prepared and examined at the present time do not agree in every respect with the natural resin acids. This fact is not surprising, however, as any one of the different groups, occurring in the molecule when oxidized, would give a different acid. It would, therefore, be mere chance if the synthetic compounds should be identical with the common resin acid.

In summing up the experimental evidence in connection with the theories of the formation of the resins and terpenes and their chemical relationship, the following syntheses may, under different conditions, represent what takes place in certain phases of plant life:

1. The formation of the resins from the simple aldehydes.
2. The formation of the resins from the complex aldehydes or carbohydrates.
3. The formation of the resins from the terpenes.

It is not impossible that the resins are formed by any one of the above syntheses. There are abundant reasons for believing, however, that the synthesis of many of the resins is intimately related to the terpenes, that is, the terpenes may be first formed from simple compounds as the hemiterpenes, then converted into the resins by condensation and oxidation. This reaction seems entirely in accord with the chemical changes which naturally take place as phytochemical changes usually proceed from the simple to the more complex, as for example, from formaldehyde to the carbohydrates, but never from the carbohydrates to formaldehyde.

From the study of these terpene derivatives, it seems more than probable that the resins, at least those of the pine family, bear the same general relationship to the terpenes that naphthalene does to benzene and that the terpene molecule, $C_{10}H_{16}$, is the common substance from which the resins are derived.

UNIVERSITY OF MINNESOTA.

SOME OF THE NEXT STEPS IN BOTANICAL SCIENCE.[1]

By CHARLES E. BESSEY.[2]

When one who has worked long in any field of science speaks before an audience such as this he is expected to say something about the condition of his branch of science when he began work with meager and poorly adapted apparatus, to contrast it with its greatly improved condition to-day, and to dwell with pride upon the finely equipped laboratories with costly apparatus especially designed for particular experiments, to be found by the twentieth century scientific student. And I must confess that the temptation to do so was one difficult to resist, for we who have grown old in years are fain to dwell upon the days of long ago with the garrulity which comes with gray heads and withering muscles. It has seemed to me wiser, however, that this evening we should look into the future rather than into the past, for in that direction lies the possibility of progress, and it is of progress that I wish to speak.

THE BOTANY OF YESTERDAY.

Yet in order that we may properly orient ourselves with reference to the area covered by the science of botany to-day, we shall have to go back a few decades to understand what additions have been made to its territory during this period of expansion. For the shrewd observer can not avoid the conclusion that botany has shared with the world powers in a territorial growth which has extended its boundaries far beyond those known to the fathers, and we have annexed much contiguous and even some remote territory in a most imperialistic fashion. It may be comforting to some people to know that during all this time there have been those who have constantly and consistently lifted up their voices in protest against this contravention of the practise of the fathers, and the breaking down and removal of the ancient landmarks. In all these years there have been botanical anti-expansionists, but like their brothers in the national field they have been overwhelmed, and the tide of expansion has swept on unchecked.

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[1] Reprinted from *Science*, Jan. 3, 1913, pp. 1–13.

[2] Address of the president of the American Association for the Advancement of Science, Cleveland, December, 1912.

Consider for a few minutes the botany of forty years ago, when you could count on the fingers of one hand the American colleges that had chairs of botany. And here I use the term chair advisedly, for they were literally chairs and not departments, much less laboratories. And everywhere else in the colleges of the country the chairs of botany were represented by what Holmes so aptly called "settees" from the number of subjects taught therefrom. The botany dispensed from these chairs was the delightful study of the external morphology of the higher plants, especial emphasis being laid upon the structure of flowers and fruits. And it may truly be said here that often the teaching was done very well, far better than many a botanist to-day is wont to imagine. I am pretty sure that in general the teaching was as successfully done then as it is now. There were some poor teachers then as there are now, and there were some inspiring teachers then who touched their pupils with the sacred fire, as there are now some who have had a divine call to teach and inspire and help.

And with this external morphology there was always associated the classification of the higher plants, in its simpler form the pleasurable pastime of identifying the plants of the neighborhood, and in its more advanced form represented by the work of Torrey and Gray and Vasey and Engelmann. And we should judge the systematic botany of that day by the work of these masters and not by the diversions of its amateurs; and you will agree with me that so judged the systematic botany of that period will not fall short of any standard we have set up in these later days.

The botany of that day was not without its laborious investigations and its tangible results. Every new area was a great out-of-doors laboratory to be diligently studied from border to border. That was the day of the founding of many small botanical gardens, and small local herbaria, some of which having served their purpose disappeared long since, while others have grown into the great and flourishing institutions of to-day.

This much as to the botany of the immediate past; the phase of the science in which the older living botanists were trained.

PRESENT-DAY BOTANY.

And what of the botany of to-day? Let us consider for a little the present condition of the science.

It is Unorganized.—The personnel of botany has greatly increased with the great increase in the territory it now includes. This personnel, it must be said, is still quite heterogeneous. Some of us are largely self-taught, so far as the major part of the subject is concerned. We brought to our work the results of the meager teaching of the old-time college class-rooms, and year by year we have enlarged the borders of our own departments as we have added to our own knowledge of the subject by means of our laboratories and libraries. Thus we have built all kinds of superstructures upon the foundations supplied by our teachers. As a consequence the science is yet largely unorganized and lacks consistency in plan and purpose. Here and there a dominant man has wrought out a scheme of the science for himself, but how familiar is the fact to all of us that there is yet no agreement even upon so small a question as to the content of the first year of college botany, or the mode of its presentation. There is moreover a vagueness as to the boundaries of the science, some botanical teachers wandering far across the border into the domain of some contiguous science, or still more commonly into the more or less practical applications of some portions of botany. This latter indiscretion is especially noticeable in the textbooks prepared for the secondary schools, in some instances by botanists of good standing. If this were done by the agriculturists, the agronomists, and horticulturists, the foresters and others in similar lines of work with plants, it would not be surprising, but when this is done by botanists it is significant of the unorganized condition of the science. With a fuller knowledge of the science there must come a clearer vision of what it is, and what it is not, and we shall no longer find textbooks of botany made to include so much that is not botany, while leaving out so much that is botany.

This difference of opinion as to what constitutes botany results in the absence of united effort. In its simplest aspect it takes the familiar form of uncertainty as to the content and value of the work done by the student elsewhere when he transfers himself from one college to another. As a matter of fact there is yet no agreement as to what is a standard first-year's course in college botany. What teacher has not been sorely puzzled to know to what courses to admit men who came from another college with credits in botany! It is quite unscientific to try to account for this condition by an excusatory reference to the individual peculiarities and the personal differences of the teachers. In science we consider the personal equation as something to be determined and eliminated, and not to be excused and tolerated. Every difference in the treatment of, say the first-year course, is just so far an indication of a more or less unscientific attitude by one or all of the teachers concerned. We work in this haphazard, disconnected way either because we do not know any better, or knowing better we think it not worth while. Either horn of this dilemma is equally unworthy of our acceptance. Ignorance is no valid excuse for the scientific man, and in science everything is worth while. It is to our shame as botanists that we acknowledge our in ability hitherto to frame a standard first-year course in college botany. When the science is definitely formulated in the minds of botanists the present disagreement will no longer exist. Surely we now " see as through a glass darkly."

The Applications of Botany.—Again, it may be remarked that we are to-day placing great emphasis upon the applications of botany to some of the great human activities, especially to agriculture. Witness the agricultural experiment stations with their botanists of all kinds, from those who study weeds and poisonous plants, to the physiologists, pathologists, ecologists and plant breeders. And as we look over the work they do we are filled with admiration and pride that they have individually done so well. But it is not the cumulative work of an army of science, it is rather the disconnected, unrelated work of so many individuals. They are doing scientific work in an unscientific way. There is as yet no movement of a united army of science; it has been rathe a sort of guerrilla warfare against the common enemy. We lack organization, and like unorganized soldiers we make little headway in spite of individual learning and efficiency. Botanical science which should have guided and directed these laudable applications has not kept pace with them, and we have the spectacle of these economic botanists, physiologists, pathologists, plant breeders and others working apart from the botanists proper, and sometimes even disclaiming any allegiance to the parent science. Nothing but confusion and disaster can result from such a condition.

Lack of Co-operation.—Contrary to what is sometimes affirmed, botanists are still studying the flora of the country. In some quarters there has been expressed the fear that field botany has disappeared from the schools and colleges; but this is far from true. While it no longer claims the larger part of the student's attention, it is still an essential part of the training of every botanist, and it is probably true that in some cases there is even more field work required to-day of young botanists than its importance demands. Certainly in one kind of field work I should like to see some of the energy and ability now given to the discovery of means for splitting old species turned towards the solution of problems pertaining to growth, and development, and reproduction. But the careful field study of what plants grow here and there, and why they do so, is greatly to be commended. The sociology of plants, or as we call it, ecology, has given in the last few years a new reason, as well as a new direction to field botany.

The systematic botany of to-day continues to concern itself more with the distinction of species than with their origin, and this has brought to this department of the science an increased narrowness which has greatly injured its usefulness. On the other hand plant breeding, which should be the experimental phase of systematic botany, has had no connection with it. And strangely, systematic botany, which should welcome plant breeding as an ally in its quest as to the meaning and origin of species, has been scarcely at all interested. It has been left to the florists, the horticulturists and the agronomists to patronize the new phase of botany, and this they have done, in spite of the new and quite unnecessarily formidable terminology so rapidly developed by the breeders. So what might have proved to be one of the most helpful aids to the solution of the greatest of biological problems—how living things have come to be what they are—is allowed to fret out its life by beating vainly against the technical bars of its Mendelian cage. I know of no better illustration of the unorganized condition of botanical science than this failure of the systematic botanists and the plant breeders to work together for a common end.

THE BOTANY OF TO-MORROW.

But I have dwelt enough upon the past and present, and I feel inclined to apologize to you for having turned your faces so long backward. For while we must consider what has been, we can make progress only by planning for what is to be. So let us turn now to the future of botanical science, and endeavor to trace its more profitable course of development during the next one or two decades. What are seemingly to be the demands of modern society upon this science? What are to be some of the next steps in its evolution? For whatever we may say in regard to the independence of science we can not escape the fact that it must serve its "day and generation." No science can hope for support or recognition that does not respond to the demands of its age. And yet we must not ignore the labors of those pioneers in every science who foresee possibilities that are hidden from the mass of men. There must always be place provided for the few seers who see to-day what is now hidden from mankind in general, and may continue to be so hidden for generations, or centuries. All honor to these prophets who prepare the way for the oncoming of scientific truth, but it is true, nevertheless, that it is only when such truth has permeated contemporary society that science thrives.

Its Content.—Looking forward, then, let us try to see the trend of that branch of science which deals with plants, the science which I have the honor of representing on this platform this evening. And my first inquiry may well concern itself with the content of botanical science in the immediate future. As we become better acquainted with it and recognize more clearly its relations to the activities of the community we shall be able to define its proper content with more accuracy. And let no man attempt to belittle the importance of such an undertaking. It is not useless to attempt to fix the boundaries of any field of human endeavor, especially in such a one as this which deals with so vast a number of individual objects, each having many possible relations to one another and to ourselves. I am well aware of the impossibility of absolutely delimiting botany from every other science, and especially of doing so with reference to many of its applications, and I am fully aware of the fact that the limits of any science are subject to change with the progress of human knowledge. Now and then there must be a "rectification of the frontier" in respect to the boundaries of a science, as with the boundaries of a great empire, as its farther provinces and the exact location of rivers and mountain ranges become better known. So without doubt we shall have to add to or subtract from the area now allotted to botany; and yet I feel that it is worth our while to spend a little time in indicating its present boundaries and content.

With all the details that may be insisted upon by some specialists it still is true that the field of botany may be considered in three parts, structure, physiology and taxonomy. Beginning with such structures as are obvious to our unaided eyes we have carried our studies to the minute structure of the tissues, and the cells which compose them. We are able now to peer into the protoplasmic recesses of the living cell, and while we can not say that we have seen life, we have seen where life is. and what it does. Cytology, histology and morphology in our modern laboratories have greatly changed our conception of the structure of the plant. It is no longer made up of forms to be compared because of their general similarity of outline, or of position in the plant body. The plant as a whole is a community of variously differentiated living units, just as is each of its organs. It is a complex community in which there is a measure of individual independence of the units, along with much of mutual dependence.

This leads me easily to that portion of the field of botany that has to do with the activities of plants and their organs—physiology—whose scope has been so greatly extended in these later years. Here such inquiries as those pertaining to nutrition, growth, sensibility, reproduction are of primary importance. The introduction of the experimental method of inquiry has made this a favorite department of the science. Who does not enjoy catching a plant, tying it up in a corner and compelling it to do something, while we watch for the result? This kind of study appeals especially to those who are looking for demonstrations, and for this reason plant physiology has been increasingly popular. Some botanists indeed have gone so far as to insist upon giving first place to physiology, probably because of its ready appeal to our senses. It is easy to interest a boy in the thing that responds, whether it be a kicking frog stimulated by an electrical discharge, or a green plant whose stimulation is a properly directed beam of sunlight. And yet it is well for us to remember that the plant is first of all a structure, whose complexity may well challenge the most acute minds. We find it far easier to record the responses of plants to our planned stimuli than to unravel a structural complex, and so no doubt we shall continue to entertain ourselves and our students with what are too often futile experiments.

In this part of the botanical field are pathology, which grew up from our observation that organs may not respond normally; ecology, which developed from the observation that plants tend to live in communities; and phytogeography, having to do with the means for and the results of distribution. There are signs that for economic reasons pathology may become rather sharply set off from physiology, of which it is properly a part, much as through the zeal and enthusiasm of the ecologists there was once the suggestion of a physiological schism. The latter is happily no longer imminent, and it may be hoped that it will not again threaten the unity of plant physiology. And so it may be hoped that the pathologists will not wholly secede from association with the physiologists.

Taxonomy, or as we used to call it, classification, occupying the third division of the field of botany, long received the almost exclusive attention of botanists. And even to-day it is the pretty general opinion of our non-botanical friends that we are constantly employed in collecting specimens, and in some intricate and mysterious way determining their classification and affixing to them their proper Latin names. And it must be admitted that every botanist does a good deal of just such work, quite as every chemist makes many analyses, and tries to arrange in orderly sequence the chemical substances which he has in his cabinet, and the astronomer classifies and names the heavenly bodies with which his science deals. At first even the botanists knew but few plants, just as now most men know scarcely more than a score. But as the botanists came to know a larger number of plants, it was imperative that they should be named, and then grouped conveniently for easier reference. Thus arose such crude, primitive classes as herbs, shrubs and trees, which served their purpose until the numbers became too great again, when additional structural differences were brought in to help separate the large numbers into smaller groups. This was the earlier classification, based upon structure alone. It was taxonomy without doubt, and it was helpful, since it enabled us to arrange plants in an orderly fashion, but it ignored the fact that plants have ancestors, and that the plants of to-day are what they are through their inheritance of ancestral characters, accompanied by modifications peculiar to them alone. When, however, the doctrine of evolution came into botany it brought with it the idea of descent, and thereafter taxonomy included phylogeny. To-day the taxonomist is no longer content to stop with a knowledge of the structural differences between plants; he must know how this structure arose from that; he must know which is the primitive structure and which the derived. Phylogeny has so far entered into taxonomy that it has given new meaning to the work of the systematic botanist, and it is bringing into this department of the science something of the philosophical aspect which was nearly wanting heretofore. That this must be the direction of the development of the taxonomy of the future is without question, and we may look confidently for a marked expansion and enlargement of the phyletic idea in botanical taxonomy.

And here I may pause for a moment to advert to a part of taxonomy with which some biologists have little patience, without good reason, as it seems to me. I refer to the matter of taxonomic nomenclature which has vexed the souls of many botanists, especially during the past one or two decades. However, since every science must have its nomenclature it is childish for us to wish to ignore it in botany. It is a part of the science, and we must give it consideration if we are to do our full duty. I have been surprised many times when men have spoken disparagingly of the whole matter of nomenclature, and of those who are giving time and effort to its stabilization. While it may be granted that not every botanist is in duty bound to help to settle questions of nomenclature, or even to take part in framing the general rules of procedure, it is the duty of every one to appreciate and encourage those who are so engaged. It has sometimes seemed to me as I have heard wholesale denunciations of nomenclature and nomenclaturists that instead of being botanists we are only cytologists, morphologists, physiologists, pathologists, ecologists.

This contempt for nomenclatural questions is symptomatic of a much-to-be-deprecated state of mind, quite too common among scientific men, especially those who have engaged in special lines of work. I believe in specialization in botany, but specialization should not degenerate into narrow bigotry. A wise man long ago admonished his friends in words which I am tempted to repeat here as most fitting:

> But now they are many members, but one body. And the eye can not say to the hand "I have no need of thee"; or again the head to the feet, "I have no need of you." Nay, much rather, those members of the body which seem to be more feeble are necessary; and those parts of the body, which we think to be less honorable, upon these we bestow more abundant honor, and our uncomely parts have more abundant comeliness; whereas our comely parts have no need: but God tempered the body together, giving more abundant honor to that part which lacked, that there should be no schism in the body, but that the members should have the same care one for another.

Wiser words of counsel for the workers in different parts of the field of a science were never written, and I beseech you, my botanical brethren, to heed them, "that there should be no schism in the body" of botany.

Personality of the Botanist.—Quite easily the foregoing leads to a consideration of the personality of the botanist of the immediate future. What manner of man will he be? What will be his training? In other words, what will the future demand of the botanist? For it does not need argument to show that the men engaged in botanical work in the future will be developed and fashioned in response to the demands of the community.

If I interpret aright the movement of modern society as a whole, it is going to result in a demand for two things that by many are thought to be opposite and antagonistic—specialization and breadth. The first it will demand of its experts, the men who are set aside to solve particular problems for the community. In most cases these will be economic problems of immediate importance to the community, but there is no reason why in the most intelligent communities they should not be scientific problems, of more remote importance. No doubt there will be a demand for many such experts, each of whose tasks will be restricted to but one problem. The only requirement laid upon these men will be that they can do the work to which they have been assigned, and the more restricted the problem the narrower may be the preparation of the expert. Such men will be demanded in increasing numbers by the scientific bureaus of the general government, by the state experiment stations and by large private establishments engaged in beet growing, cane growing, fruit growing, potato growing, hop growing, etc., and it will be the duty of the teachers of botany to produce an adequate supply of such botanical experts.

But while the community is certain to increase its demand for botanical experts we must not overlook the fact that with this demand will come another, much more imperative, for men of far greater breadth and depth of knowledge, who in addition to training the botanical experts of various kinds for the community, are able to bring the science as a whole before the youth of the land as a part of the scientific culture which modern society requires. These must be men of the broadest training; men whose sympathies are not bounded by the one science which they know, much less by one phase of botanical science; men who, knowing well their one science, know also much of the related sciences; men who in addition to a knowledge of science bring to their students and their community the results of that broader view which relates botany to the life and activities of the community. Such men bear the name of botanists worthily, and justify the contention of scientific men that science may contribute more than material good to the community. These are Lord Bacon's "Lamps," and "Interpreters of Nature."

And my vision is by no means unrealizable. Already among botanists there are those who measure up to this ideal. Already there are those who to a wide and deep knowledge of plants add that breadth of culture that brings them into sympathetic relations with the company of scholars throughout the world. As I speak these words there will come to you the names of those of our number who are known and honored as botanists, but whose beneficent influence extends far beyond the limits of their science. And I am confident that this high standard, now reached by some, will be demanded for all by the community of the future. Such botanists will be the leaders of their students, guiding wisely their early steps in science; they will be the leaders of the experts whose results they will be able to relate to other parts of the botanical field; and they will be the leaders of the community, not only in the applications of botany to the solution of material problems, but in a larger and nobler manner they will be able to help them in the higher things that make for culture and spiritual uplift.

The Teaching Institutions.—Turning now to the institutions of learning—the colleges and universities—where botany holds a place as one of the sciences, let us ask what we may look for in regard to its development. In every proper college the department of botany exists primarily for its teaching function, and this is true also for nearly every university. And while we may hope to make every such department a centre of investigation also, it is true now, and it must always be true that in our educational institutions the teaching of the science must be the primary object of every one of its scientific departments. So the future will call for much more of definiteness as to the content and sequence of the science, as well as the manner of its presentation; its pedagogics, if you please.

The college and university departments of botany in the near future will arrive at a clearer notion as to the essentials of the science as a subject of study. It seems to one who carefully looks over the field that there is often only the most vague notion of the relative importance of the known facts in regard to plants, those of trivial importance receiving as much weight, perhaps, as those of profound significance. Especially is this true of the more elementary courses, in which there is also the greatest diversity in the presentation of the subject matter. This condition argues incompleteness of knowledge either as to the science as a whole, or as to its pedagogics. We have all heard the excusatory remark that "it makes little difference how or where we begin the study of plants, and in what sequence we pursue it." Yet none of us would admit such a contention in regard to any other matter. The more we know of a country, the more definite are our ideas as to what are its more important mountains, rivers, cities and institutions, and it is these that we feel the traveler should see. We particularize when we know; we generalize, and are vague, when we do not. It should not be long until this vagueness and doubtfulness as to substance and manner in the presentation of botany in the high school, and in the college, and in the university, will be a thing of the past. In the near future we shall certainly have the lower work clearly defined, as it is in mathematics and language, and on this the higher work will be based, to the great saving of the time and energy of teacher and student, now needlessly wasted. And I appeal to you, botanists, to take up seriously the task of so arranging and co-ordinating our work that botany shall no longer suffer the reproach of being the most chaotic of the primary sciences. Do not tell me that we can not agree. *We must agree.* If we know our science sufficiently well we can easily discern the more important parts. Let him whose knowledge is too limited to enable him to see over the whole field step aside. Let him who has no adequate perception of the pedagogical aspects of the problem step aside. Then let the select few make a pronouncement, subject to periodical revision. This is the way that scientific men should settle the question. This is the way it will be settled some day, in the not very distant future.

The Botanical Stations.—But the college and university departments are by no means all that are engaged in botanical work. Within the past twenty-five years many stations have arisen in which botanical investigations are made. Under various local names they are in fact "investigation stations" and while their results have not been uniformly reliable it is a most hopeful sign of progress that they exist at all. Foremost among these are the fifty or more agricultural experiment stations to which I have already briefly referred, with assured support from the states and the national government for all time to come, in which botanical investigation forms no inconsiderable part of the work undertaken. Hampered as they generally were in their earlier years by incompetent direction, and often by still more incompetent workers, it is gratifying to know that year by year there has been marked improvement in both, and that now many of the directors are men of such scientific training that they wisely use the means at their disposal for investigations of permanent scientific value. And if I read aright the tendencies in these stations, it will not be long until their scientific output will be wholly reliable, as indeed it is now in some cases. This condition will be fully realized when these stations are wholly under the direction of men of broad scientific training.

And here again we have a duty to perform. We must recognize the agricultural experiment stations as permanent parts of the botanical equipment of the country. They will be with us in the future, and their results will continue to be added to botanical knowledge. We must accept them as a part of our scientific equipment, and help to make them more efficient. It will not do for us to stand aloof, and decry their results as not accurate, and as agricultural instead of botanical. When we fully realize that we have in these experiment stations so many institutions of endowed research, we shall not hesitate to welcome them to the ranks of science. The fact that these researches in regard to plants so often have an economic purpose does not lessen the value of the results to the botanist of broad training and sympathies. Here again we must remember that as botanists we should not undervalue those contributions to knowledge in which we happen not to have an immediate interest. My scriptural quotation of a few minutes ago might well be repeated here: "the eye can not say to the hand 'I have no need of thee,' or again the head to the feet 'I have no need of you.'" When they receive the hearty co-operation of the botanists of the country the agricultural experiment stations will develop into centres of investigation of the greatest importance to science.

Already we have stations for the study of plants under particular environments, as our seaside stations, our mountain stations and a single desert station. I take it that these are suggestive of what are to come in the future. Instead of trying to make seaside conditions away from the sea, we go to the sea and there set up our laboratories. So when we want to know how plants behave in the desert we go to the desert. And this is no doubt to be the direction of botanical investigation. We are going to study plants under their natural environment, and to the seaside laboratories we shall add (as indeed we have already to a limited extent) lakeside laboratories, riverside laboratories, swamp laboratories, forest laboratories, field laboratories. Already the tropical laboratories, in Java, Ceylon and Jamaica have justified themselves, and no doubt to these we shall soon add arctic and tundra laboratories. All this signifies that more and more we are going to see what the plant is doing in its natural environment, and then we can undertake intelligently to watch it under a changed environment. So the future is to witness a great increase in the number of these laboratories, and how far it will go can only be conjectured. It now appears probable that eventually every botanical department will have one or more of these environmental laboratories in which work may be done by advanced students. They will take the students out of doors, as the old-time systematic botany took them out, but these students will go equipped with thermometers, psychrometers, anemometers and balances, instead of vascula and plant presses. Thus we shall again go afield, but on what a different quest! The old-time botanist in the field was mainly concerned with the question of the specific identity of each plant he found;

the botanist afield in the future will ask what the plants are doing under this or that environment. He will not neglect the earlier question, in fact he must have that answered, but that answered he has still his main question before him. The work in the field laboratories must necessarily be of the kind now called ecological, and so as I see it the botany of the future will have much more of ecology than is common to-day.

Yet when we think of these botanical stations whose laboratories are taken afield, as it were, we must not suppose for a moment that the old-time laboratories on the university campus are to be abandoned. Far from it. As the work in the field laboratories is enlarged there will be still greater need of the far more exact work that can be done only in laboratories where every factor can be perfectly controlled. There will still be need, greater need I might say, for perfectly constructed plant-houses in which we may observe plants under controlled conditions, and where we may increase or decrease this or that factor at will. I emphasize this point because there are some who prophesy the eventual abandonment of the precision laboratory in botany, when in fact everything points to the opposite conclusion.

Another kind of station, of which we have now only the beginnings, is one which will carry the results of plant breeding into the domain of phylogeny. Of this we have now some faint suggestions, which must grow into far reaching results under the direction of men who know more of the subject than we do now. It may be that such stations will then, as now, have a strong economic bias, but this will not so narrow them as to exclude the phylogenetic aspects of the work they are doing. In such laboratories we shall be able to see how evolution has contributed to the present wonderful diversity of form and size and color and habit among related plants. Such laboratories will enable us to answer the demand formerly so often made, but less often heard now, for a demonstration of cases of actual evolution. Although such cases are well known to botanists, their occurrence has hitherto not been such as to admit of easy citation for purposes of popular demonstration. So I regard the breeding laboratories of the future as welcome additions to the means of demonstration which science will possess.

Unity of Action.—Allow me to look once more into that future which holds so much of promise for botany. I am assured as I consider the trend of scientific thought that there will be greater unity of action among the botanists of the country. At present we are still in the guerrilla stage of botany, in which every man acts independently and for himself. And it must be admitted that much effective work is done by guerrillas in war and in science, but in both there is far too much waste of energy. Let me pause a moment to explain more fully what I mean by this guerrilla condition in botany. Although we profess to be botanists acting for the best interests of science, we have actually no uniform standard by which we may measure our actions. In one particular we have tried to set up a standard, in certain international rules pertaining to nomenclature: and yet after several congresses of botanists we have the humiliating spectacle of a set of laws that nearly everybody disobeys! In other matters also, every man does as he pleases; and the worst of it is that he vehemently defends this free, untrammeled mode of action. We have been guerillas so long that we resent the suggestion of conformity to any regulation.

Brethren of the ancient order of botanists, this is scientifically quite unseemly. We must cease this personally independent, but disorderly life, and enroll ourselves in the regular army as good soldiers who will obey orders, and who will act in unison for the common good. And this is no illusory vision. It is one of the things that the future will bring us, yes, I may say, is bringing us. For already we find the beginnings of a reduction of some of the disorder in certain fields of work. In the management of the work of the agricultural experiment stations there are hopeful signs of a healthy progress. Certain officers in Washington, having general supervision over the stations, seeing that there is much useless duplication, have begun suggesting more harmonious planning, one station to emphasize this line of investigation, and another that line, instead of working quite independently of one another. This beginning is suggestive of what might and should be done elsewhere.

And we shall not confine unification and co-ordination to investigation alone, but will carry it into the teaching departments. As a matter of course the more general aspects of the science must find place in every college department of botany, requiring to this extent the quite legitimate duplication of the best laboratory and other facilities that can be provided. But beyond this the duplication should cease, especially of facilities that are costly in installation and maintenance. When we fully reach a condition of scientific sanity we shall agree upon such a program as will assign particular fields of work to those institutions that are best able to care for them, and it follows that students will be sent to these for such specialties. In the case of the state institutions there is already the beginning of the attempt to reduce needless duplication —in some instances crudely and awkwardly, it is true—but the significant thing is that there is already an attempt to reduce duplication. Which suggests that "the children of this world are in their generation wiser than the children of light."

This is not the place for the discussion of the details of the educational co-operation which is coming—a co-operation which will result in a conservation of educational energy. As the details are needed they will be worked out, but I may be permitted to suggest that in the near future we shall reach a solution something like the following:

(*a*) That the small colleges shall provide a standard course in general botany, with adequate facilities as to material and apparatus.

(*b*) That the larger colleges and universities shall provide an identical standard course for those of its students who have not pursued this subject in the small colleges, and to this they will add certain advanced, also standardized, courses, requiring facilities beyond the reach of the small colleges.

(*c*) Then will come, especially in the state-supported schools, such advanced courses as are required by the nature of the institutions, and the needs of each particular state; as the study of useful plants, noxious plants, local systematic botany, dendrology, pathology, etc.

(*d*) Last will come a division of labor with regard to the more profound lines of research and teaching. Certain favored institutions will place especial emphasis upon minute anatomy (cytology and histology), or special morphology, or physiology, or plant breeding, or ecology, or phytogeography, or special taxonomy, or general and experimental evolution, or botanical history, etc.

These suggestions are not chimerical. They are indicated by the recent trend of scientific thought, which recognizes more and more the value of the conservation of human effort. And as I look into the future a vision rises before me of the scientific army, working harmoniously like well-drilled soldiers, and not wasting their strength by turning their guns on one another. In this army of science I see a company of thoroughly disciplined botanists who in orderly fashion plan their campaign. And, from the many doing severe garrison duty in the small colleges, to the heavy artillerymen in the big university fortifications, and the few isolated scouts along the frontier of special investigation, all are actuated by a common spirit of scientific patriotism and loyalty.

This, my botanical brothers, is what the future is bringing us—a united, harmonious body of trained men, whose endeavor is to carry forward the banner of science, not for personal advantage, but for the glory of the science to which we have dedicated our lives.

ABSTRACTS OF SOME PAPERS READ AT THE MEETINGS OF THE PENNSYLVANIA AND NEW JERSEY PHARMACEUTICAL ASSOCIATIONS FOR 1912.

By John K. Thum, Ph.G., Pharmacist at German Hospital.

An Improved Formula for Mistura Rhei et Sodæ.

By Adolph F. Marquier.

The writer states that the present official formula for Rhubarb and Soda Mixture makes a preparation which is too sweet because of the large amount of glycerin present and that the essence of peppermint could be reduced with decided advantage. He suggests the following formula:

Sodium bicarbonate	35.0 Gm.
Potassium carbonate	3.0 Gm.
Fluidextract rhubarb	15.0 c.c.
Fluidextract ipecac	3.0 c.c.
Spirits peppermint	15.0 c.c.
Alcohol	100.0 c.c.
Glycerin	250.0 c.c.
Water to make	1000.0 c.c.

Mix and filter.

From Proc. N. J. Pharm. Assoc.

THE DETERMINATION OF GLYCERIN IN SUPPOSITORIES.

BY CHAS. E. VANDERKLEED AND FRITZ HEIDLBERG.

In determining the amount of glycerin in suppositories the authors adopted a method which is based upon Hehner's bichromate method for the estimation of glycerin:

Half of a suppository—about 2 grams—is dissolved in a separator with hot water acidified with sulphuric acid and shaken out with ether, thereby separating the stearic acid. The aqueous solution is evaporated to a small volume which drives off all the ether; the solution is then transferred to a 250 c.c. volumetric flask and filled to the mark with water.

Twenty-five c.c. of the filtered solution is measured into a 250 c.c. volumetric flask, 35 c.c. of potassium bichromate solution is added, and lastly 25 c.c. of strong sulphuric acid is added slowly with constant rotation to avoid ebullition. The flask is then transferred to a boiling water-bath for 20 minutes, cooled, and filled to the mark. In 25 c.c. of this solution the excess of bichromate is determined by adding 20 c.c. of potassium iodide T. S. and titrating against approximately N–10 sodium thiosulphate solution, the factor of which toward the potassium bichromate solution has been determined previously. Calculate the amount of potassium bichromate which has been used to oxidize the glycerin to CO_2. One c.c. of potassium bichromate is equivalent to 0.01 glycerin.

The bichromate solution is made by dissolving 74.615 grams recrystallized potassium bichromate in distilled water, adding 150 c.c. sulphuric acid and making up the volume to 1000 c.c. at 20° C.

With some modification the same method was used to determine glycerin in a mixture of potassium chlorate, chalk, phenol, soap, and essential oils, as they occurred in a toothpaste.

From Proc. Penn. Pharm. Assoc.

AQUA CARYOPHYLLI.

BY MILTON DUNN.

The author states that the Elixir Digestivum Compositum, and various elixirs of lactated pepsin on the market, are used principally as vehicles and as such are not satisfactory, notwithstanding all that has been done to make them popular with physicians.

He suggests the following formula for a clove water, stating that it meets all possible requirements as a vehicle and is particularly efficient for the administration of bromides and iodides.

Oil of cloves	4.0 c.c.
Tincture of cudbear	50.0 c.c.
Alcohol	43.0 c.c.
Purified talc	15.0 gm.
Water to make	1000.0 c.c.

Mix and filter.

From Proc. Penn. Pharm. Assoc.

SAFFRON.

BY R. I. GRANTHAM.

Because of its excessively high price saffron is frequently found on the market adulterated in many ways.

Among the methods practised for this purpose the author mentions the mixing with vegetable filaments, coloring with aniline dyes, and by adding articles of high specific gravity, such as glycerin, molasses, honey, and salts of sodium and potassium, as well as barium sulphate to increase its weight.

The author gives the result of some tests on 4 samples to determine the presence of added coloring matter of aniline origin. The results so far as color from this source is concerned were negative.

From Proc. Penn. Pharm. Assoc.

LABORATORY NOTES.

BY THOMAS A. EGAN.

Commenting on the manufacture of zinc oxide ointment the author recommends that the zinc oxide be triturated in a mortar with 10 per cent. of oil of benne until perfectly smooth, then melt the lard, add to contents of mortar and stir continuously until mixture becomes firm. By this method an ointment is obtained which remains smooth and does not become granular with age.

Discussing the time-honored Basham's mixture, he remarks that the varying temperature of the store is the source of trouble with this preparation, as it favors chemical change. He replaces part of the water used in making this preparation with orange flower water and keeps it in the refrigerator.

Claiming that if kept 10 feet below the surface of the ground it acquires an aroma equal to imported cologne water, he gives the following formula for its manufacture:

Oil of bergamot	6 drachms
Oil of lemon	7 drachms
Oil of lavender flowers	5 drachms
Oil of rosemary	50 drops
Oil of rose	8 drops
Oil of cloves	13 drops
Oil of neroli	10 drops
Tincture of musk	10 drops
Cologne spirits	56 ounces
Orange flower water	8 ounces
Powdered sandalwood	1 drachm

From Proc. Penn. Pharm. Assoc.

DETERIORATION OF SYRUP OF WILD CHERRY.

BY J. GRAHAM FRENCH.

The author gives the method of determination and results in a series of experiments to determine just how long after date of manufacture the hydrocyanic acid in syrup of wild cherry disappears.

Three lots of syrup were prepared and tested. In each case about 10 c.c. was distilled by passing live steam into the syrup. To the distillate was added a mixture of ferric chloride and ferrous sulphate, the latter being in excess. The solution was then made alkaline with sodium hydrate solution and the precipitate formed dissolved by the addition of hydrochloric acid. A blue or green color was taken as an indication of the presence of hydrocyanic acid.

He says that he feels justified in stating that the acid disappears within 3 or 4 months after date of preparation.

From Proc. Penn. Pharm. Assoc.

HOW SHOULD RETAIL DRUGGISTS KEEP LEECHES?

BY W. A. PEARSON.

The author endeavored to determine whether leeches would be longer-lived kept in a jar covered with cheese cloth, containing 200 grammes of animal charcoal and 1000 c.c. of water, or the orthodox way of a tin can, with moist earth.

He gives the results of a series of tests and states that he feels justified in recommending the charcoal-water method of keeping leeches because the odors from which leeches die are largely absorbed by the charcoal, insects cannot be attracted to the dead leeches, the leeches can easily be caught by pouring the mixture through a coarse sieve, and dead ones can readily be removed in the same manner.

From Proc. Penn. Pharm. Assoc.

THE PURITY OF GELATIN.

BY J. G. ROBERTS.

The author's attention having been brought to a report in foreign journals that arsenic had been found in excessive amounts in gelatin of German manufacture, he deemed it worthy of investigation, and accordingly several brands found on the market were examined. The presence of arsenic is explained by the fact that hides and trimmings used in the manufacture of gelatin had been treated with an arsenic solution during the process of curing.

As gelatin is of much use for household and pharmaceutical purposes its purity is of some importance.

Arsenic in quantities greater than one part in a million was found in two samples of German manufacture. Samples made in Belgium, one from Austria, and two samples of ground gelatin of domestic manufacture contained no arsenic, while two others of domestic manufacture contained only traces.

In order to extract the arsenic the author subjected the gelatin to special treatment in order to change it into a soluble form and obtain a sufficient quantity of arsenic to get a distinct reaction. Twenty grams were heated in an evaporating dish with 35 c.c. of arsenic-free sulphuric acid until a dried, charred mass remained. Fifteen cubic centimetres of nitric acid was then added in small portions while heating cautiously, and the heating continued until the excess of acid was expelled and the residue dry. Residue was then extracted with 30 c.c. of hot water, the solution filtered and Marsh's test applied in the usual way.

From Proc. Penn. Pharm. Assoc.

ELEVENTH INTERNATIONAL PHARMACEUTICAL CONGRESS.

The Eleventh International Pharmaceutical Congress, under the august patronage of his Royal Highness, Prince Henry of the Netherlands, will be held at the Hague from September 17th to the 21st, 1913. This has been organized and developed primarily under the auspices of the Netherland Pharmaceutical Society with the following Executive Committee:

General President: Prof. Dr. L. van Itallie, Leyden; *Vice-Presidents:* Dr. H. L. Visser, Nijmegen, President of the first section, General Subjects; Prof. P. van der Wielen, Amsterdam, President of the second section, Galenical Pharmacy; Prof. Dr. N. Schoorl, Utrecht, President of the third section, Chemistry; Dr. J. Dekker, Haarlem, President of the fourth section, Botany and Materia Medica, and Prof. Dr. H. P. Wijsman, Utrecht, President of the fifth section, Bromatology. *General Secretary:* J. J. Hofman, The Hague, 4, Schenkweg, The Hague. *Members:* G. H. van der Wal, The Hague, General Treasurer; Dr. J. F. Suyver, Amsterdam, and Miss A. Grutterink, Pharm. Dr., Rotterdam.

REGULATIONS OF THE ELEVENTH INTERNATIONAL PHARMACEUTICAL CONGRESS.

Date and Place.—1. The eleventh International Pharmaceutical Congress, organized by the "Nederl. Maatschappij tot bevordering der Pharmacie" (Netherland Pharmaceutical Society) will be held at The Hague—Scheveningen in the month of September, 1913.

Committees.—2. A Committee is charged with the organization of the Congress.

This Organizing Committee chooses from its members an executive committee which will consist of: a General President, 5 Vice-Presidents (presidents of the sections), a General Secretary and an Assistant-Secretary, a Treasurer, and one member.

The Council of the committee will consist of: the general president, the general secretary, and the general treasurer.

In agreement with the Council, the vice-presidents arrange all matters pertaining to their sections, and appoint the committees with their secretaries for these sections.

The executive committees will have the power to appoint special committees, as may be necessary for making arrangements for the reception of the members of the congress with their ladies, and for other purposes.

Members.—3. Any person interested in one of the subjects mentioned in Art. 7 of these regulations, may become a member of this Congress.

4. The members are divided into:

Patrons, ordinary members, and extraordinary members.

Contributions.—Patrons pay a minimum contribution of 25 guilders (£2. 1 sh.) to defray the expenses of the Congress.

The contribution of ordinary members is fixed at 10 guilders (16 sh. 8 d.). They send in their applications to the General Secretary of the Congress.

Rights of the Members.—Patrons and ordinary members of the Congress may attend all the meetings festivities, and excursions of the Congress, they have a vote, and receive the reports and other printed publications of the congress.

The ladies or the members of the families of the patrons and ordinary members of the Congress may become extraordinary members by paying a contribution of 5 guilders (8 sh. 4 d.) They may attend the meetings of the congress, but have no vote. They are invited to the different festivities or excursions, organized by the Committee. They do not receive any reports or printed publications.

Membership of Societies.—5. A Society, represented by one or more of its members, can also be accepted as a patron or ordinary member. In this case the contribution due, is to be paid for each representative.

Subjects.—6. All patrons and ordinary members have a right to contribute a scientific paper to the Congress, and to discuss a subject or introduce one for discussion.

Sections.—7. The Congress is divided into 5 sections:

1. General Subjects. Legislation. Organization. History of Pharmacy. Education. Training. Military Pharmacy.
2. Galenical Pharmacy. Pharmaceutical preparations. Art of dispensing. Technics.
3. Chemistry.
    a. Preparation and examination of medicinal products. Analytical Chemistry.

b. Toxicology, Physiological and Pathological methods of examination.

4. Botany and Materia Medica. Pharmacognosy. Examination of drugs. Bacteriology.
5. Bromatology. Examination of foods. Institution of a Board of Inspection for foodstuffs.

Languages.—8. The official languages of the Congress are Dutch, French, English, German.

Reports.—The reports will be written in French. The papers and publications which are sent in, may be written in any of the abovementioned languages; but, if required, an abridged report written in French, will be added.

9. The committees of the Congress also have a right to publish the reports and communications which have not been discussed in the meetings of the Congress.

Meetings.—10. There will be general and sectional meetings.

At least two general meetings will be held. The dates and the lists of subjects will be fixed by the organizing committee. The sections will meet as often as is considered necessary, and they will be independent as to the arrangement of their work.

11. At the end of each sectional meeting the secretary will hand over to the general secretary the text of the subjects treated, of the proposals, and of the resolutions carried by the meeting. The report of the meeting must reach the general secretary before the next meeting of his section is held.

The Council of the Congress.—12. The first general meeting will be presided over by the general president of the organizing committee. In this meeting the following members will be appointed: the general president of the Congress, 5 vice-presidents (presidents of the sections), the honorary vice-president of the Congress, the honorary sectional presidents, the general secretary, the treasurer, and the assistant secretaries.

The Next Congress.—13. In the last general meeting it will be decided when and where the Twelfth International Congress will be held.

Sectional Meetings.—14. The first sectional meetings will be presided over by the presidents appointed for this purpose.

In these first sectional meetings the sectional committee will be chosen.

Votes.—15. All resolutions of the general as well as of the sectional meetings are carried by a majority of votes.

16. Without the president's consent, nobody is allowed to speak for more than two periods of 5 minutes during the debate.

Reports.—17. The reports of the meetings will contain: *a.* A list of the subjects treated, the names of the speakers, and an abridged report of the debate. *b.* Resolutions carried by the meeting

18. In order to ensure the exact wording of the report, every speaker is requested to give an abridged report of his speech to the secretary within half an hour after the meeting is adjourned. It is preferred that this report be written in French, but it may also be written in any other of the above-mentioned languages. The sectional secretary gives these reports, together with a list of the members who have been present at the meeting, to the general secretary.

19. The resolutions of an international character will be communicated to the governments by the Committee of the Fédération Internationale Pharmaceutique.

20. A general report of the Congress will be sent to the patrons and ordinary members.

All documents and other reports of the congress will be handed over to the Fédération Internationale Pharmaceutique when the Congress is finished.

Archives and Reports of the Committees.—21. The reports of the committees, appointed by this Congress, will be handed over to the Fédération Internationale Pharmaceutique, which, together with the Council of this Congress, is entrusted with the winding up of current affairs.

22. The Council of the Congress will decide any subject which is not treated of in these regulations.

PROGRAM OF THE SECTIONS.

SECTION I: GENERAL SUBJECTS.

Committee: Dr. H. L. Visser, President, Dr. W. v. d. Slooten, Secretary, J. van Riel, and Dr. L. M. v. d. Berg.

Subjects Introduced for Discussion.

1. The different systems of practising Pharmacy, their advantages and disadvantages. (Concession, free establishment, State or municipal pharmacies.)

2. Is it desirable to limit the sale of pharmaceutical specialities exclusively to the pharmacists? In what manner can these specialities be defined and how can the sale be regulated by act of Parliament?

3. The supply of medicines in rural districts.

4. International arrangement of the pharmaceutical nomenclature.

5. National and local organizations of chemists.

6. International trade in pharmaceutical specialities.

7. Pharmaceutical education in different countries.

8. The assistants in dispensaries. The advantages and disadvantages of assistants, who do not possess a chemist's diploma and cannot obtain one.

9. The military pharmacist working in behalf of hygiene and of the chemical and technical service.

10. What measures can be taken to enforce the observance of laws regulating pharmacy?

11. The training of and the requirements for the analytical assistants in pharmaceutical and chemical laboratories.

12. Free treatises on the subject of historical pharmacy.

SECTION 2: GALENICAL PHARMACY.

Committee: Prof. P. van der Wielen, President, E. S. van Itallie, Secretary, Miss C. H. Hugenholtz, and Dr. J. S. Meulenhoff.

Subjects Introduced for Discussion.

1. International standards should be made concerning the value of those medicines for which international requirements concerning quality exist.

2. Preparation of galenicals by hand is a necessary preparation in wholesale laboratories. It is possible only if there is a proper and responsible control over the materials and the methods of preparation.

3. The preparation of aromatic waters.

4. Is it desirable to adopt a uniform method of expressing alcoholic strength in percentage by weight?

5. When a medicine has to be reduced to its proper strength by dilution, a limit should be established for the quantity of the neutral diluent to be added.

6. The establishment of a minimum limit for the active strength of medicines without establishing also a maximum limit, is wrong.

7. How does cultivation influence the activity of vegetable drugs?

8. Has the presence of oxydases in the materials any influence on the quality of galenicals?

9. Is it possible and desirable to give in the official regulations physiological as well as chemical methods for the analysis of galenicals?

10. Can it be justified that regulations or requirements for medicines should be changed on other than medical grounds?

11. A uniform international agreement for establishing uniform methods in the preparation of galenicals should be made after a comparative examination of the various processes.

SECTION 3: CHEMISTRY.

Committee: Prof. Dr. N. Schoorl, President, W. C. de Graaff, Secretary, Prof. Dr. P. van Romburgh, Prof. Dr. G. Hondius Boldingh, Dr. P. C. Meerburg, Dr. W. E. Ringer, Dr. D. J. Hissink, Dr. A. Robertson, and J. W. de Waal.

Subjects Introduced for Discussion.

1. In how far would it be possible to shorten the chemical monographs of the Pharmacopœia in a reasonable way?

2. What requirements should be established for the quality of the glass used in pharmacy?

3. Codification of the requirements of purity necessary for chemicals.

4. Unification of the so-called standard-solutions; also with respect to their preparation, preservation, and purity.

5. The influence of the metals lead, zinc, tin, copper, nickel, and aluminium on water.

6. Comparative examination of the methods for measuring the hardness of water.

7. Comparative examination of the qualitative and quantitative methods of testing pepsin, trypsin, and other proteolytic or peptolytic ferments.

8. Is the action of pepsin identical to that of chimosin or not?

9. The occurrence, the significance, and the tracing of ferments in animal excreta.

10. The conduct of albuminoids in an aqueous solution by the side of salts, and in connection with the reaction of the medium.

11. The desirability and possibility of a codification of clinical and chemical methods of analysis.

12. A critical examination of the reliability of the formol-titration of ammonia, aminic acids, and albuminous products in urine.

13. How can lævulose be definitely identified in urine? And is it due to the alkaline reaction of the blood?

14. In what forms can uric acid (and uric salts) be precipitated from a solution?

15. The significance and the method of chemical analysis of sweat.

16. The formation of oxalic acid in animal and vegetable organisms.

17. The toxicity of methyl alcohol.

18. The rational analysis (quantitative) of the inorganic elements in animal and vegetable organs and products.

19. Critical and experimental discussion of the methods for the destruction of organic materials in toxicological analysis.

20. Comparative examination of the different methods for estimating protoxyde of potassium in manure.

21. The non-nitrogeneous extractive materials of different foods.

22. Comparative examination of the different methods of estimating phosphoric acid in manure.

23. Analysis of and requirements necessary for potassium-phosphate as a food for animals and as a medicine.

24. The rational methods of sampling for the analysis of materials in connection with the accuracy of the analysis.

25. The injurious forms of arsenic in wall-paper and their quantitative determination.

26. The toxicity of nickel-salts in connection with the use of nickel kitchen utensils.

27. The estimation of the quantity of sand in foods for men and animals.

SECTION 4: BOTANY AND MATERIA MEDICA.

Committee: Dr. J. Dekker, President, Dr. H. W. Nijdam, Secretary, Prof. Dr. C. van Wisselingh, Prof. Dr. E. Verschaffelt, and L. H. van Berk.

Subjects Introduced for Discussion.

1. The quantitative estimation of quinine and other alkaloids in cinchona-bark.

2. What is the significance of the "pyro-analysis" for the examination of drugs?

3. The estimation of the value of coca-leaf.

4. The importance of bacteriology to students of Pharmacy.

5. What is the function of hydro-cyanogen in the organism of plants?

6. Quantitative investigations about the influence of poisonous materials on plants.

7. In how far do chemical data assist the botanist in systematic classification of the different kinds of plants?

8. What are the functions of tannin in the vegetable organism?

9. The function of latex in Hevea Brasiliensis and other plants producing india-rubber.

10. The occurrence of saponins in the vegetable kingdom.

11. The physiological measurement of the value of Folio digitalis, Semen strophanthi, etc.

12. The influence of enzymes on the activity of drugs, during collection and drying.

SECTION 5: BROMATOLOGY.

Committee: Prof. Dr. H. P. Wijsman, President, Dr. A. Lam, Vice-President, and Dr. A. van Raalte, Secretary.

1st Subsection: Chemistry of Foods: Dr. A. Lam, President, Dr. J. D. Filippo, Dr. H. van Gulik, Dr. G. Romijn, Dr. J. J. van Eck, Dr. F. H. van der Laan, Dr. A. J. Swaving, and Dr. G. Voerman.

2nd Subsection: Biology of Foods Prof. Dr. G. van Iterson, Jr., President, Prof. Dr. C. Eykman, Dr. Ch. Ali Cohen, Dr. C. W. Broers, F. F. Bruijning, Jr., and B. A. van Ketel.

Subjects Introduced for Discussion in the Meeting of the Complete Section.

1. Which is to be preferred: to make up lists of colouring materials and preservatives, the use of which is permitted to the exclusion of all others; or to make up lists of prohibited colouring materials and preservatives?

2. The influence of government control on the price of foods.

3. Quantitative determination of sugar in jams, etc., by means of chemical and biological methods.

4. The analysis of drinking-water in places near the sea coast and, in general, in places with a saline soil.

5. Description of the ideal "baby-food."

6. The grading of flour according to different methods, for in-

stance by a microscopic measurement of the bran; comparison of their value.

7. The growing stale of bread.

8. Should foods which under certain circumstances produce prussic acid be allowed for consumption?

9. Foaming-materials in lemonade.

10. Examination of enamelled kitchen utensils.

11. Methyl alcohol in beverages.

12. Protection of food against insects.

13. Dangers of tuck-shops and of sweetmeats.

Subjects Introduced for Discussion in the Chemical Subsection.

1. The application of colorimetry in the analysis of food.

2. The importance of refractometry in the chemistry of foods.

3. To ascertain the adulteration of milk by means of the freezing point method and the serum method of Ackerman.

4. The use of new vegetable fats in the margarine-industry.

5. Rational classification of cheese according to the quantity of fat it contains.

6. Influence of the chemical composition of butter-fat on the consistency and the qualities of the butter, also in connection with the composition of the milk.

7. Controlling the pasteurisation of milk by non-bacteriological methods.

8. The minimum amount of fat in cocoa-powder.

9. Direct chemical measurement of fecula.

10. The bleaching of flour.

11. Components of the fermentation products obtained from other juices than grape- or apple-juice.

12. The detection of organic poisons (toxins and the like) in food.

13. Denaturation of alcohol.

14. Estimation of manganese in drinking-water.

15. Analysis of mineral and medicinal waters.

16. The amount of fibrous substance in cocoa and chocolate.

Subjects Introduced for Discussion in the Biological Subsection.

1. Biological analysis of drinking-water.

2. The significance of other components of foodstuffs than albumen, fat, and hydrocarbon.

3. Serum reactions in the analysis of food.

4. Correlation between the morphological qualities of corn and the baking value of flour.

5. Microscopical analysis of bread.

6. Statistical method of describing articles of food; especially fecula.

7. Physico-chemical and biological analysis of milk, in connection with certain forms of disease of cattle.

8. Direct microscopical counting of bacteria in drinking-water.

9. Coli bacilli in pasteurised milk and in water.

10. Bacteriological analysis of prepared meat foods.

11. The value and the analysis of yoghurt, maya, and other preparations of the kind.

12. Maturing processes in cheese.

13. Colonial alcoholic fermentation products (arrack, rhum, etc.).

14. Examination of oysters.

15. Sterilisation by means of ultra violet rays.

16. The connection between food commodities and infection.

GENERAL INFORMATION.

Secretary's Office and Inquiry Office.

The Congress will be held at the Kurhaus, Scheveningen.

The General Secretary's office and the inquiry office at the Kurhaus will be open from September 16th until September 21, 1913, from 9 A.M. to 6 P.M.

For the members of the Congress a special Post and Telegraph Office will be established in one of the wings of the Kurhaus near the Secretary's Office.

Obtainable at the Inquiry Office:

1. Member's tickets for the congress and badges.

2. All official communications and reports concerning the congress.

3. Tickets for the congress dinner.

4. Tickets for excursions and for the different museums, amusements, etc.

Messrs. Lissone and Son's Office will place one of their officials at the disposal of the members in order to give any information wanted and to compose circular tickets for the railways.

Meetings of the Sections.

These will be held on the 18th of September in the various laboratories of the Leyden University.

About the Sending in of Reports for the Congress.

1. All reports and contributions for the Congress should be sent. in legible writing (by preference in duplicate and type-written) to the general secretary of the Congress before June 1st, 1913.

2. They should be written on one side of the paper only.

3. To all reports must be added:

    1. The conclusion the report arrives at.
    2. A concise survey of the report, preferably written in French.

4. All reports and documents that reach the general secretary before the 1st of June, will be printed beforehand, and sent to the members of the Congress by request; they can be obtained at the general secretary's office before the opening of the Congress. Papers that come in after that date, will appear in an appendix, but the general secretary cannot guarantee their publication in time for the opening of the Congress.

5. All reports, papers, etc., must be accompanied by the writer's name and full address.

6. All contributions must be original; they must not have been published elsewhere.

7. The contributors must conform to the resolutions of the Committee of the Congress concerning the publication of their reports.

8. After the appearance of the reports, papers, etc., in the Congress-report, and in any case after the 31st of December, 1913, the members will be at liberty to publish their reports and communications elsewhere.

9. All contributors will receive 50 copies of their reports and additional copies will be obtainable at cost price.

10. The Committee of the Congress has a right to refuse reports and communications which are not considered suitable for discussion at this Congress or which are of a too strong personal character, or might cause a too violent debate, or serve as a means of advertisement.

11. If the reports are too lengthy the Committee may resolve to publish an abstract only.

12. For the explanation of a report, only ten minutes can be allowed at the meeting.

13. In case of the writer's absence, only the title of the report will be made known, while the discussion will be held from the printed papers.

14. Those who take part in the discussion will be given an opportunity to communicate their remarks briefly to the secretary.

Travelling Accommodation.

The Holland-America Line will reserve better class cabins at minimum saloon (1st class) fares for visitors of the Congress who leave New-York on board one of their steamers after August 10th, and return after October 18th. These minimum fares are for ss. "Rotterdam" 107.5 dollars; for ss. "Nieuw-Amsterdam" 95 dollars; for the other steamers 85 dollars.

The Batavier Line Rotterdam—London will give a 10 per cent. reduction on their fares to members of the Congress.

The Royal Holland Lloyd will reserve better class cabins at minimum saloon (1st class) fares for members of the Congress leaving South-America after August 15th, and returning after October 1st.

The Royal West-Indian Mail Service draw special attention to their excursion tickets, return fare for six months, 450 guilders (£37. 10sh. 0d.). These are issued at Paramaribo and Trinidad. Moreover, the Company give a 15 per cent. reduction on first-class return tickets from Venezuela, Curaçao, Haiti.

Lissone and Son's Office will give the necessary information about ordinary and circular trips through Holland which members may wish to take after the Congress is finished.

Members of the Committee of the Congress will meet all international expresses arriving at The Hague on September 16th and 17th at the Holland Railway and State Railway stations, in order to give any information required.

Hotels.

The "Maatschappij Zeebad Scheveningen" will reserve rooms in their hotels for the members of the Congress at a uniform price of 3.25 guilders (5/5) for rooms for 1 person, and 6 guilders (10/–) for rooms for 2 persons, including breakfast and attendance.

Exhibition.

The Committee of the Congress intend to hold, in one of the halls of the Kurhaus, an exhibition of photographs and pictures of pharmacies throughout the world. Therefore, the Board will gladly receive photos, of external and internal views of pharmacies, pharmaceutical laboratories, pictures of dispensaries of former times, etc.

The Committee will also endeavor to collect a number of pictures of pharmaceutical Institutes and laboratories of Universities. Those who are willing to contribute to this exhibition are kindly requested to send their photographs, etc., to the general secretary of the Congress at The Hague.

Excursions, Receptions, and Festivities.

A programme of the excursions, receptions, and festivities in connection with this Congress, will be published in due time.

THE PHILADELPHIA COLLEGE OF PHARMACY.

Minutes of Quarterly Meeting.

The quarterly meeting of the Philadelphia College of Pharmacy was held December 30th, 1912, at 4 P.M., in the Library, with the president, Howard B. French, in the chair. Eleven members were present. The minutes of the semi-annual meeting held September 30th were read, and approved. The minutes of the Board of Trustees for September, October, and November, were read and approved.

The President announced the deaths of Miss Florence Yaple and Alexander H. Jones, both life members of the College. Miss Yaple was long associated in the work of the American Journal of Pharmacy and a biographical sketch of her is given in this Journal for November, 1912. Mr. Jones had been in the service of Powers and Weightman since boyhood.

Mr. George M. Beringer reported the death of Charles S. Braddock, of Haddonfield, N. J., which occurred on December 1st, 1912. Mr. Braddock was a graduate of the College, though not a member, and because of his long and useful career a record of his death is recorded in the transactions of the College.

The name of Professor Thomas Franz Hanausek, Ph.D., of Austria, proposed for Honorary Membership at a previous meeting, was balloted for, and unanimously elected.

The names of Sister Bertha Mueller, William Wilson Rose, and Elmer H. Hessler, previously reported for Associate Membership and approved by the Committee on Membership, were balloted for and unanimously elected.

The following communication was read:

October 7th, 1912.

PROFESSOR SADTLER.

DEAR SIR: Your letter of the first of October received. I sincerely thank you for hearty congratulations extended to me on the anniversary of my eighty-first birthday.

Very sincerely yours,

F. GUTEKUNST.

The President reappointed the Committee on Legislation: Warren H. Poley, Joseph P. Remington, William McIntyre, Theodore Campbell, William E. Lee, William L. Cliffe.

C. A. WEIDEMANN, M.D.,
Recording Secretary.

ABSTRACTS FROM THE MINUTES OF THE BOARD OF TRUSTEES.

October 1st, 1912: Fourteen members were present. The Secretary of the College reported that Aubrey H. Weightman, William E. Lee and O. W. Osterlund had been re-elected to membership in the Board.

The Committee on Property reported that the various repairs and alterations undertaken by the Committee were completed and that the College buildings were in good shape.

Committee on Library reported the purchase of a number of books during the month, and the gift of "Elements of Experimental Chemistry," by Mr. I. B. Sweitzer, of the Class of 1888.

Committee on Accounts and Audit reported they had examined the accounts of the Treasurer, Registrar and Committee of Publication and found them correct.

Professor C. B. Lowe reported that he had arranged with Doctor Robert N. Wilson to deliver a lecture to the students, and suggested procuring copies of a circular recently issued by Doctor Wilson, for distribution to the students. The request was granted.

The Committee on Scholarships reported the names of ten (10) persons as deserving of free Lecture, Laboratory and Recitation tickets for the Course beginning 1912, and recommended that the awards be granted. The recommendation was approved.

A communication was received from Mr. William Dick, Secretary of the Board of Public Education of Philadelphia, naming four persons from the Manual Training and High Schools who had been awarded scholarships in the Philadelphia College of Pharmacy. The recommendation was approved.

Committee on Examination reported that the re-examinations had been held, and reports were being received.

Athletic Committee reported a series of rules governing the Gymnasium, and of the necessity of having some one in authority present while the gymnasium was in use, and recommended engaging Mr. F. N. Moerk till the middle of March, 1913, for this purpose. This recommendation was approved.

Mr. John K. Thum was elected to active membership.

November 6th, 1912: Fourteen members were present. Special Committee on Scholarships reported several recommendations governing the Award of Scholarships, which were approved. A very extended discussion took place in reference to establishing fellowships. The matter was referred to a special committee to consider the subject.

The Committee on Library reported a number of accessions by purchase during the month, and that sixty-four persons had consulted the Library during the month.

December 3rd, 1912: Eighteen members were present, Professor F. X. Moerk being present by invitation.

Committee on Library reported that a number of books had been procured by purchase, and one book by gift from the *Druggist's Circular*. Also that seventy-six persons had used the Library during the month.

Committee on Instruction presented a matter of importance to the College—the discussion was prolonged till the hour of adjournment—and on motion it was agreed to call a meeting of the Board for December 6th.

December 6th, 1912: Fourteen members were present, Professor Moerk being present by invitation. The Committee on Instruction presented a series of resolutions offered by Mr. French, which after discussion were adopted.

Mr. Beringer referred to the present method of advertising the College and moved that the entire matter be referred to a Special Committee, consisting of the Finance Committee and Committee on Announcement.

Professor Remington stated that Mr. C. E. Hires, a graduate of the College, had presented to the College four water coolers and would supply the drinking water free of charge. The thanks of the Board were tendered the donor.

EWEN McINTYRE, 1825–1913.

THE AMERICAN
JOURNAL OF PHARMACY

MARCH, 1913

BIOLOGICAL STANDARDIZATION OF THE DIGITALIS BODIES BY THE CAT METHOD OF HATCHER.

By Cary Eggleston

From the Department of Pharmacology, Cornell University Medical College, New York City.

Since the publication of this method by Hatcher and Brody[1] a number of observers have subjected it to more or less unfavorable criticism and it is the purpose of the present communication to discuss these criticisms and to subject the method to an even more rigorous scrutiny, comparing it with some of the other and more widely used methods, in order to determine which of them is the most serviceable. Much of the material is drawn from reports found in the literature, or from the laboratory records of several who have carried out many series of standardizations on cats, and the rest from the personal experiences of the author.

Before passing to an analysis it seems advisable to outline the important factors which must be considered of value in any method. These desiderata are:

1. The method should be reasonably accurate and give fairly concordant results on repeated tests of the same preparation.

2. Results obtained with the same preparation tested at long intervals of time should be strictly comparable, and deteriorations, if present, should be detected.

3. It should, as far as possible, eliminate adventitious factors such as might cause variations in the results, e.g., absorption, climatic effects, seasonal changes, etc.

4. Range of applicability; it should be equally applicable to the

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[1] A. J. PHARM.; 1910; 82; p. 360.

testing of most, or all, of the numerous digitalis bodies, pure principles, galenicals, proprietary preparations, and the specialties.

5. It should afford a means of comparing widely different members of the group, both as to their relative activity and their probable toxicity for man.

6. The results of the evaluations should be more or less fully transferable to man.

7. It should test that action of the drug upon which its therapeutic use depends.

8. It should be sufficiently simple to be mastered by the relatively inexperienced so that its use may be wide.

9. It should be humane.

10. It should not be too time consuming.

11. It should not be too costly.

It is in the light of these desiderata that the cat method will be criticised and compared with the other commonly used methods. Those with which it will be compared are: 1. the twelve hour frog method of Houghton[2]; 2. the one hour frog method of Famulener and Lyons[3]; 3. and the guineapig method of Reed and Vanderkleed.[4] No discussion of the technical details of the several methods will be given, for it is taken for granted that those to whom this comparison will be of interest are more or less familiar with these details, and the references cited will provide others with the facts as described by the several authors.

As the cat method is the one which is to be subjected to criticism and compared with the other methods, I will present a number of standardizations made by it and taken at random to provide material for analysis. These are given in Table I.

TABLE I.

MISCELLANEOUS ASSAYS.

Exp.	Drug	Dose in Mg. X kg.	Average	Maximum variation from average in per cent.
	Ouabain A			
1		0.086		
2		0.110		
3		0.090		
4		0.099		
5		* 0.069		

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[2] A. J. PHARM.; 1909; 81; p. 461.

[3] Proc. Am. Pharm. Ass.; 1902; L; 415.

[4] A. J. PHARM.; 1908; 80; p. 110.

Exp.	Drug	Dose in Mg. X kg.	Average	Maximum Variation from average in per cent.
	Ouabain A.—*Cont'd.*			
6		0.085	0.098	33.6%
7		0.110		
8		0.102		
9		* 0.067		
10		0.110		
11		* 0.131		
12		0.116		
	Ouabain B			
1		0.101		
2		0.122	0.109	11.9%
3		0.105		
4		0.109		
	Convallamarin			
1		1.51		
2		1.78	1.68	10.1%
3		1.77		
	Fluidextract Squill			
1		545		
2		645	580	11.2%
3		525		
4		595		
	Fluidextract Apocynum			
1		65.0		
2		67.5		
	Tinct. Digitalis Ger. A			
1		122		
2		137		
3		117	120.8	13.4%
4		119		
5		108		
6		122		
	Tinct. Digitalis B			
1		57.7		
2		54.8	57.7	5%
3		60.6		
	Tinct. Strophanthus			
1		2.44		
2		2.40		
	Fluidext. Adonis, very old			
1		880		
2		700	895	21.7%
3		1045		
4		755		
	Adonidin			
1		3.75		

Exp.	Drug	Dose in Mg. X kg.	Average	Maximum variation from average in per cent.
	Adonidin—*Cont'd.*			
2		4.28		
3		5.10	4.34	17.4%
4		3.58		
5		5.00		
	Helleborein			
1		1.66		
2		1.70	1.88	31.3%
3		2.47		
4		1.72		
	Digitalein			
1		3.7		
2		3.2		
3		3.5	3.47	7.7%
4		3.45		
5		3.5		

CRITICISMS AND COMPARISONS.

The first of the desiderata is that the method shall be reasonably accurate and give fairly concordant results on repeated tests of the same preparation. Reference to the table will immediately give the idea that the cat method fails in the first and most important requirement. Careful consideration, however, will show this to be an impression rather than a fact. For example, in series A of ouabain the maximum variation from the average dose as determined by the twelve tests is 33.6 per cent. of the average. Further, each of the starred experiments varies from the average dose of the series by at least 30 per cent. These are very great variations for a test which is to establish a standard, but if the average of the entire twelve be taken as the result of the standardization of the specimen, which is in fact precisely what is done in any method of biological assay, it will be seen to lie only 2 per cent. below the average determined by a very large number of series of tests made over several years (see H. & B.[1]).

It will be shown that in this or any other biological method of assay a certain number of animals will be found to be either tolerant or susceptible to the action of a given drug. Thus, in each of several series of experiments reported by Hatcher and Brody [1] such variations were seen and from these I will cite the following example: Four cats received digitalinum verum requiring 1.50, 1.52, 1.56, and 1.80 mg. per kilogramme, respectively, to cause death, last animal being abnormal in reaction. It is, therefore, obvious that one must not trust the reaction of a single animal, or take the average of the results of tests on two animals which show considerable variation. In view of this fact one should discard those results which were obtained upon animals showing obvious abnormality of response. Such a practice is common to all of the methods of assay here considered and is an entirely justifiable procedure.

Applying this means of rendering the use of animals more exact, from a quantitative point of view, to the series under discussion, one would have to discard the three starred experiments before making his calculations. The average dose calculated from the remaining nine tests is 0.100 mg. per kg. of cat, which is precisely the average previously determined for this specimen of ouabain. With this correct average and the three very abnormal results discarded there is still a maximum variation from the average of 16 per cent. in the case of one experiment. This may be explained on the ground of season, a matter to be discussed subsequently.

When the same arguments and methods of correction are applied to some of the other series we see how much greater is the accuracy of the cat method than was at first thought. Thus, in series B of ouabain experiment 2 was obviously made on an abnormal cat and when discarded from the calculation the variation between the three experiments remaining falls to 3.8 per cent. of the average. Again, in the series with helleborein, the figure 2.47 is obviously far too high and the animal from which it was obtained was certainly tolerant. With it eliminated the maximum variation from the corrected average is only 1.7 per cent. of the average.

I might here state that in a series of standardizations of 24 different specimens, including many different types of digitalis bodies and extending over nearly two years, variations were found ranging from less than one per cent. up to 17.4 per cent. of the average taken in each series. The average variation was 6.1 per cent. for the entire 24 series of tests.

In carrying out the cat method of standardization in actual practice at least three animals are used and if all three give closely similar results the average is taken as being correct. If two of the results are quite close but the third is considerably at variance a fourth, or even a fifth, test is made before an average is struck.

An exception to the use of three tests is sometimes made when the first two are found to give very closely similar results, as for example, in the cases of apocynum and the tincture of strophanthus cited in the table. Even in such circumstances, if the test is one of a preparation for use in man, or of one which is wholly unknown as to approximate cat unit, a number of tests is always made for the sake of greater accuracy and certainty.

It may be contended that two of the three or four cats which are employed in a routine assay might readily be abnormal in reaction, and in the same direction. This would, to a certain extent, be an invalidating feature of the method if such an occurrence were likely, but it is, fortunately, an almost impossible accident, for it has not been possible to find an abnormal reaction of thirty per cent. or over in more than eight animals in 300; that is, only 2.7 per cent. of all cats are found to be very abnormal in reaction. This group of 300 experiments is made up by beginning at the latest series and counting back for nearly two years, including every experiment in each series of tests. The figure is therefore a fairly trustworthy index of the frequency of occurrence of decidedly abnormal animals. No evidence is to be found in this series to show that either tolerance or susceptibility is the predominant abnormality, hence the chance of two animals falling in a single series and having the same type of abnormality of reaction is very slight indeed. Just such a rare coincidence was observed, and is shown in series A of the ouabain tests given in the table, experiments 5 and 9. This was a long series and the three abnormal experiments present are seen to have been scattered throughout the group, so that had any set of four or five tests been made these abnormal reactions would have been recognized as such and due allowance made for them.

Comparing the variations encountered in the cat method with some of the reported results of the frog methods of testing, or with the guineapig method, we find that 6 out of 60 frogs showed an error of from 9 to 10.6 per cent.[5] Hale asserts[6] that the frog method gives, "an estimate of the amount of glucosides in a solution to within a few (1-10) per cent. of absolute accuracy." But Vanderkleed[7] has shown that with uniform conditions the lethal dose of ouabain for female frogs is about 19 per cent. greater than for males.

How these variations compare with the results obtained by the cat method will be seen by consulting the figures for the different standardizations of ouabain made at different times and often with "unknown solutions." For example, the two series reported in the table show the following: 1. If the uncorrected results are used the average of the first series falls only 2 per cent. below the established standard, while that of the second series lies 9 per cent. above this standard. 2. When the averages taken are based upon the corrected series (after the elimination of the very abnormal animals) A shows an absolutely correct result and B gives a figure 5 per cent. above the standard. Ouabain is selected to show the extent of the variations obtained by standardizations made at different times because it is the purest of the isolated glucosides and is the least liable to variation in its strength. Similar close estimations have been found in repeated tests of a great many other digitalis bodies made in this laboratory, the results often being obtained by several different observers and with "unknowns." An instance of this is found in the case of the digitalis leaf which supplied the tincture marked Ger. A. This leaf yielded an assay of approximately 120 mg. per kg. of cat as its unit when other preparations were used—both tinctures and infusions.

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[5] A. J. PHARM.; 1911; 83; p. 97.

[6] Hygien, Lab. Bull.; No. 74; 1911.

[7] A. J. PHARM.; 1912; 84; p. 14.

The guineapig method is stated [8] to provide a means of making preparations, "which are always within ten per cent. of the same strength." But Haskell [9] expresses his belief in the variability of guineapigs and says, "I have been unable to find the report of a single series of experiments performed with the object of showing that guineapigs are not fully as much influenced by adventitious circumstances as are frogs." Vanderkleed [7] replies to this assertion citing the results of a series of 43 tests in which only one animal showed a variation as great as 10.4 per cent. Houghton [10] found these animals unsatisfactory, and Hale [5] says, "certain animals survived doses 20 per cent. larger than had killed others. Thus, 4 were killed with 0.5 mg. per gram of body weight, 3 lived with 0.6 mg. doses of the same drug." Lastly, Haskell [11] reports several series of standardizations of ouabain on guineapigs and shows the occurrence of variations, under similar conditions, ranging from 11 to 30 per cent. of the average found in the series under consideration. He remarks that, "the individual variation of guineapigs is by no means inconsiderable."

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[8] A. J. PHARM.; 1910; 82; p. 453.

[9] A. J. PHARM.; 1911; 83; p. 201.

[10] *J.A.M.A.*, 1898, xxxi; 959.

[11] A. J. PHARM.; 1912; 84; p. 241.

With regard to the individual variations and the effects these may have upon the ultimate accuracy of the estimations by the several different methods of biological assay there would seem to be rather wide fluctuations. But by the judicious application of the pruning knife of reason the markedly abnormal animals can be discarded, be they frogs, guineapigs, or cats, and the final results will show that each method affords a means of determining the strength of a given preparation with a limit of error of not over ten per cent. From this point of view, then, there seems to be but little choice of method, the one hour frog method probably giving the least range of variation in the testing of any *single* preparation of a simple nature, provided that it is soluble in water.

The second requirement of a method is that the results which it gives should be constant; that is, a given preparation should show approximately the same value when tested at different times and after long intervals if it does not itself undergo deterioration. If it does deteriorate, the method should give an index of this change. This is peculiarly true of the cat method, for with the most permanent preparation which we have, ouabain, we have been able to obtain a uniform value since 1909; the specimen used then still gives a cat unit within 5 per cent. of 0.1 mg. per kg. of animal. Similar experiences with other members of the group have already been mentioned, namely, the case of the German leaf A.

Some of the critics of this method state that, being a general toxic one it will not show deterioration in digitalis preparations, for the products of deterioration are likewise toxic and the activity may, therefore, remain unchanged, or even become increased. This is not the fact. Instance the old specimen of fluid extract of adonis which gave a cat unit of 895 mg., while a fresh specimen, of which we also had a sample of the powdered drug, gave a unit of about 100 mg. for the tincture and also for the leaf in the form of a fresh infusion. We have recently examined a preparation of squill, a fluid extract, which gave a cat unit of 561 mg. several years ago and which now gives about 1100 mg. as its unit. It is unnecessary to multiply the examples further to show that the cat method fully meets the second requirement.

The frog methods also accomplish this purpose to a certain extent, but a cause of inaccuracy and untrustworthiness in such determinations lies in the variations in reaction between different batches of frogs and will be discussed later.

The extent to which the guineapig method may be expected to provide a similar means of comparison cannot as yet be definitely stated, but certain results obtained by Haskell would seem to show that seasonal variations in these animals are such that comparisons cannot be drawn between tests made at different times of year. In a period of five months a given specimen of ouabain was tested on these animals and the activity found varied from 0.000,000,28 to 0.000,000,52 gram per gram of pig. .Such enormous variations are absolutely unknown in cats, and have never been reported in frogs, by whatever method tested.

The method should be as little subject to the influence of adventitious factors as possible. All, or nearly all, are agreed that frogs are very susceptible to the influence of such factors, and the warmest advocates of the frog as a test animal admit that size, sex, season, temperature, moisture, presence of eggs, region from which obtained, etc., may materially affect the reaction of the animal to the heart tonic group. Baker[12] has made a study of many of these factors and states that: "The results emphasize the necessity of using a preparation to standardize the frogs for each series of assays." This necessity is becoming generally recognized by most of the workers in this field and such standardization introduces certain factors of great detriment to the general applicability of the method to the entire digitalis series. This will be considered separately.

In addition to the factors already mentioned as influencing the results on frogs it is to be recalled that dilution of the drug has a marked influence on the result obtained. Hale emphasizes the importance of maintaining the concentration of the specimen to be tested within such limits that the fatal dose for a frog will be contained in one cubic centimeter of the solution. Focke[13] states that the degree of dilution in the case of the strophanthus preparations is very important, for, "a higher dilution results in a higher reaction value."

Guineapigs seem to be quite as susceptible to the influence of extraneous factors as are frogs. Thus, Vanderkleed found that these animals are very susceptible to changes in diet and ventilation, and that these factors very quickly impair the health of the pigs or cause many of them to die. Haskell's observations on the seasonal variations in the reaction of guineapigs to a fixed drug, ouabain, show an enormous range of variation in response for different months. Thus, a series run in August gave the fatal dose, in terms of grams of the drug per gram of animal weight, as 0.000,000,28; in October the dose was 0.000,000.36; in November and December 0.000,000,52; in January 0.000,000.52+; in February 0.000,000,35 to 0.000,000.40; and in March it had come back to 0.000,000.36. From the lowest fatal dose of a series to the highest there is a difference of 0.000.000,24 gram per kilo of animal; that is about 100 per cent. of the lowest and 50 per cent of the highest. Haskell concludes, " From an examination of these tables, it is evident that in assaying a preparation of the digitalis group upon guineapigs a standard preparation is as necessary as is the case with frogs."

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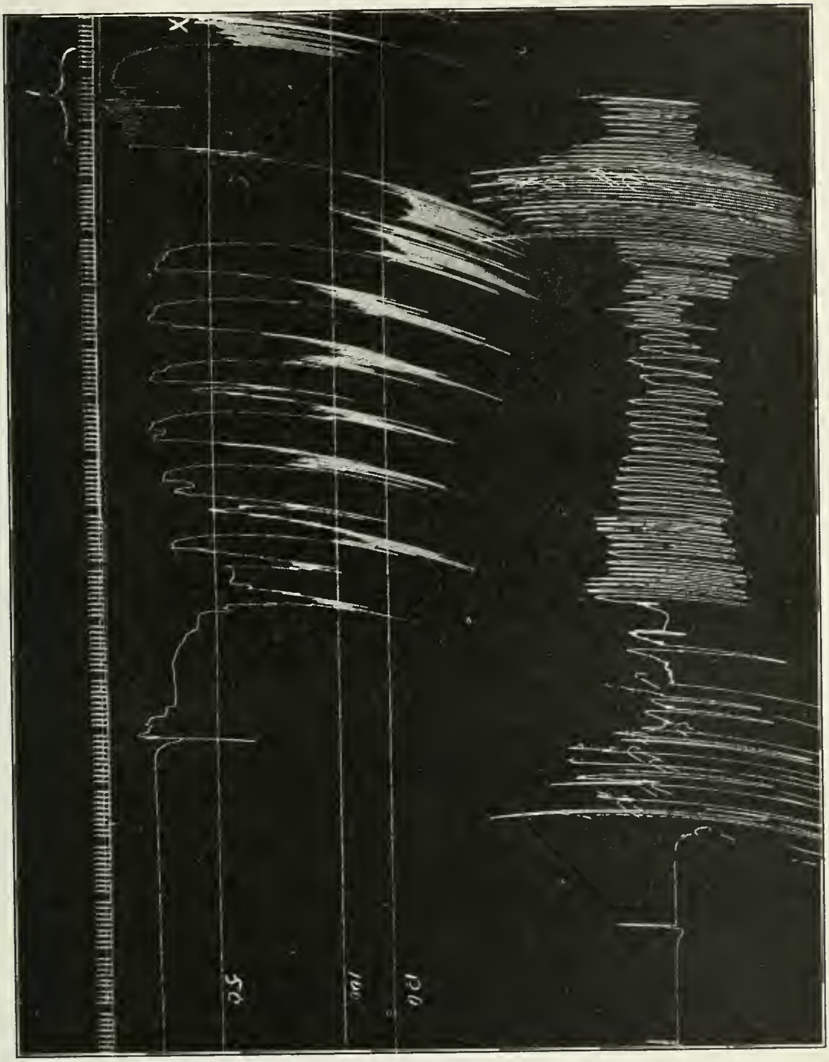
[12] A. J. PHARM.; 1912; 84; p. 247.

[13] *Arch. der Pharm.* 1910, 248, p. 345.

As is to be expected the cat method is also influenced by certain adventitious factors. Among those which have been brought up against it is the use of an anesthetic. This feature is one which we feel has given rise to a number of the great variations which some have reported from the use of this method, for it is not a difficult matter to kill a cat with an overdose of ether, and some of those who report these great variations have called attention to the fact that some of their animals died from respiratory failure. Such a mode of death is exceedingly uncommon in our experience, the heart practically invariably coming to a standstill before respiration fails, and while the respiratory center is still very active. This fact is confirmed by the observations made by Eckler, who found the heart to have stopped in nearly every case when the chest was opened at once after apparent death. Out of his 69 experiments he found the heart beating in only seven animals, " and in these the contractions were very feeble." The tracing shown was taken from the carotid artery and the trachea of a cat and shows the stoppage of the heart prior to that of respiration, and also partly explains the beating of the heart found in the seven cats reported by Eckler. This tracing is but one of a large number taken in this laboratory and represents the usual conditions of digitalis death.

Much stress has been laid upon the necessity for the continuance of an absolutely uniform grade of anesthesia during the course of the assay. In years of use of the cat method almost all of the possible changes have been rung on the grade and uniformity of the anesthesia and, short of killing the animal with the anesthetic, such variations seem to have little or no effect on the accuracy of the method. A simple method of avoiding the dangers of the use of the volatile anesthetics is the substitution of one or another of fixed ones, such as chloral or paraldehyde. Experiments show that such substitution does not perceptibly influence the dose of the digitalis body required.



Tracing from the carotid-lower, and trachea-upper, at time of death from digitalis, cat. The points X correspond in point of time. Heart stopped suddenly six seconds after X, and respiration is seen to continue for more than a minute and a half, in fairly normal manner after brief stimulation. Bracket over I corresponds in time to bracket above respiratory tracing, and these oscillations in the pulse curve are seen to be attributable to the negative pressure in the heart due to increased inspiration, being synchronous with respiration. Several groups of rapid heart beats occur after the first stoppage lasting

Food and drink has been stated to be a factor of great importance, especially in regard to the relation of the time of feeding or drinking to that of the testing. This can be made uniform and negligible by feeding at the same hour each day, the best time being late in the afternoon, thus leaving time for the complete digestion of food to have taken place before the animals are to be used for the tests on the following day. Food has also been shown to influence the reactions of frogs and guineapigs. Certainly the time of feeding will have as much effect upon the pigs as on the cats, for the influence is merely one of unknown alteration in the weight of the animals.

Sex influences the reactions of frogs, as has been shown (page 107), but *per se* it seems to have little or no influence on mammals. The occurrence of pregnancy or lactation on the part of cats does have a profound, and quite uncertain, effect upon the susceptibility of the animals, and we have seen variations from this cause of rather more than 50 per cent. in rare instances. Eckler reports the finding of one animal which took five times as much as the average, but in many hundreds of tests made in this laboratory we have never seen a tolerance even one-fourth so great as this. In view of the variability in pregnant and lactating cats they must, of course, not be used in biological assays.

We found that in one or two instances we could not secure the usual approximate uniformity in reaction between the individual animals of a series, even when using ouabain. All other possible factors being eliminated, it was suggested by Dr. Hatcher that the irregularity in response might be due to a seasonal variation in the susceptibility of cats. The animals seemed to be far less uniform in reaction in the summer months than at other times of year. Analysis of the records showed this to be the correct explanation, as is well illustrated in the table. Ouabain series A was made in the months of July and August and shows considerable lack of uniformity between the reactions of the several animals. Series B, on the other hand, was made in March and, with one exception, the variation between the individual animals is very slight.

This seasonal variation in cats is slight as compared with that shown to exist in guineapigs by Haskell (page 105). Even with the tendency to greater variation in the susceptibility of different cats during the summer months, it is possible to obtain results which very closely approximate the standard for a uniform preparation such as ouabain by the running of a small series of tests. This is shown by the series Ouabain A.

In none of the methods is it suggested that immature animals may be used along with mature ones, and one of Eckler's cats which showed marked abnormality of reaction was obviously a kitten, weighing only 970 grams. One of the first observations made by Hatcher on the factors which may enter to cause variations in the response of cats was the effect of an overabundance of fat ([1]) and this probably accounts for another of the great variations observed by Eckler, for one animal weighed 4.7 kg.

It is stated that frogs coming from different localities, although of the same species, show differences in reaction to the same preparation. Such does not seem to be the case with cats. We have established the cat unit for ouabain as 0.1 mg. per kg. and Eckler's table of 26 tests gives an average of 0.095 mg. per kg. A series of eight cats sent to us from Ithaca gave 0.093 mg. as the unit.

The fourth important requirement is that the method of standardization shall have a wide range of applicability, that is, it should be possible to use it for the evaluation of pure principles, galenical preparations, proprietaries, and unknown solutions containing one or more of the members of the digitalis group.

Both the guineapig and frog methods fail in greater or less degree to provide for such contingencies. In both the element of absorption is an essential factor and is the chief element which limits the range of applicability of these methods. Specimens which contain relatively large amounts of colloidal material would probably be found to give values considerably too low by the guineapig method, as colloids are well known to exert a marked inhibitory action upon absorption from the subcutaneous tissues. In the case of the frog methods this element of absorption is well illustrated by our utter inability to establish any fatal dose for liquid digalen by the one hour tests. Hale's determination which shows crystalline digitoxin to be, "eight times less active than amorphous strophanthin" is another illustration of the effect of absorption. Certainly no one believes that this ratio is in any way proportional to the relative activity of the two drugs for man or the higher animals.

High alcoholic content of the preparation renders it necessary to evaporate off the alcohol, at least in part, and make up the solution with saline for testing by the frog method, and the same process is followed by Reed and Vanderkleed in their tests of tinctures on guineapigs, although they state that the guineapig is very resistant to alcohol. The introduction of heat and the change of solvent are capable of materially altering the activity of some of the digitalis preparations.

The cat method has neither of these disadvantages. The question of absorption does not enter, as the drug is introduced directly into the circulation. The alcoholic content of the preparation does not prevent its assay without evaporation unless it is extremely weak in cardiac activity, for the preparation is diluted for injection and the administration is so slow that the alcohol which is introduced never accumulates in the body to an extent sufficient to cause more than very slight cerebral depression. When the preparation is very highly alcoholic, or so weak that a relatively large volume of alcohol would have to be given, it is still unnecessary to remove any of the alcohol or to reduce the volume by evaporation, for the combined method with ouabain is readily applicable and gives equally good results. These statements are supported by the experiments cited in Table 2.

TABLE 2.

STANDARDIZATION OF LIQUID DIGALEN.

CAT METHOD.

Specimen	Dose in c.c. X kg.
A	1.86
	2.06
	1.94
B	2.00
	2.06
	2.03
C	1.57
	1.59
	1.17
	1.55
	1.74

ONE HOUR FROG METHOD—Specimem C.

Dose in c.c. X kg.	Result	Remarks
0.045	beating	incomplete absorption
0.045	systolic stand still	complete absorption
0.060	beating	incomplete absorption
0.060	beating	incomplete absorption
0.075	beating	incomplete absorption
0.075	systolic stand still	complete absorption

It is unnecessary to give a longer series of tests on frogs as no concordant results could be obtained by the method. Death in many of the other frogs used in which the dose was somewhere within the limits stated above, and where absorption was complete, was delayed much beyond the hour, or the heart was found beating feebly with the ventricles in a condition of mid-diastole; in still others the ventricles were found in complete diastole. The frogs were standardized against ouabain and reacted normally. All of them were between 20 and 30 grams in weight, and all were males and healthy.

Weis[14] experienced similar difficulty with the one hour frog method in testing liquid digalen, and found that glycerin in dilute solution retards absorption markedly. Tests which we made with crystalline digitoxin prepared in a menstruum similar to that of digalen showed a similar inhibitory action of the glycerin on absorption, with the result that the dose determined was much too high. The frog method is further unsuited for the testing of this preparation (Digalen) because the smallest dose which would kill the animals at all was more than one c.c. for a frog of average size, ranging up to 2.5 c.c. in some cases. In comparison with these results those obtained by the cat method are found to be very concordant and satisfactory. The greatest variation with specimen A is 5.6 per cent. of the average dose, and in B only 1.4 per cent., while in C one animal fell 23.0 per cent. below the average; with this latter discarded the maximum variation is only 8 per cent. of the average dose. It is interesting to note that digalen, which is said to consist of amorphous digitoxin, and which seemed so weak by tests on frogs, when used in the liquid preparation, was found to be very active on frogs when the tablets were used and the solution prepared without glycerin, whereas the tablets were found to be much weaker when tested on cats. This discrepancy is easily understood if we suppose that the rapid absorption of the glycerin-free solution hastens the action on the frog's heart.

Illustrating the applicability of the cat method to the testing of very highly alcoholic preparations the results obtained with two samples of fluid extract of adonis, tested by both the direct and the combined methods, may be cited. Together with this there is given an assay of the leaf from which one of the fluid extracts was made. One of the fluid extracts was made with 50 per cent., the other with 75 per cent. alcohol. The figures are given in Table 3.

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[14] Oest. Sanitaetswesen; Beilage zu No. 22, May 30, 1912.

TABLE 3.

STANDARDIZATION OF FLUIDEXTRACT ADONIS.

Specimen	Direct Method Dose in Mg. X kg.		Combined method Dose in Mg. X kg.	
A	110	= 102	130	= 111
	130		98	
			107	
B	100	= 94	105	= 100
	88		96	
Fresh Infusion of Specimen B.				
A	100	= 96.5		
	93			

In this series of standardizations there were but few tests and no special effort was made to obtain an exact evaluation in any case, as the purpose of the tests was merely to show whether there was any very great difference in the activity of preparations made with different strengths of alcohol, and a number of different samples were to be tested, coming from widely different sources.

The fifth consideration is that of providing a means of comparing widely different members of the group, both as regards their relative activity and with reference to their toxicity for man.

The elements introduced by the factors of absorption in the frog and guineapig methods limit the usefulness of these with regard to this last requisite. It is well known that even the so-called pure principles, and those which are the purest—ouabain and crystalline digitoxin—are entirely different in their absorbabilities from different tissues. Further, the relative activity of digitoxin and amorphous strophanthin as found by Hale on frogs is certainly no indication of the relative toxicity of these two drugs for man. Famulener and Lyons found strophanthin 17 times as toxic as crystalline digitoxin on frogs, but surely no one would venture to give a man 17 mg. of the latter by vein at a single dose, granted that it could be administered thus, yet if the method is to be of value as an indication of the probable activity of different digitalis bodies for man such a comparison should hold. Again, in testing the liquid preparation of digalen on frogs Hale found the most active specimen to be 2.75 times weaker than crystalline digitoxin, while Weis also found the drug very much weaker than it is claimed to be. In contrast with these findings we were unable to fix the dose of the liquid preparation on frogs by the one hour method, but by extracting the amorphous digitoxin, so-called, from the tablets and using it in solution in saline we found that the fatal dose per gram of frog was 0.0085 mg., or that the drug is of equal activity to crystalline digitoxin. This finding compares well with the result of tests of the liquid preparation by the cat method, from which we found the most potent sample to be almost identical in activity with crystalline digitoxin.

It is evident from these illustrations, and from others which could be cited, that the frog method does not give results which can be transferred to man, in the matter of showing the relative activity of different preparations. This fact was early observed by Focke, the first to suggest the use of the frog and the strongest advocate of the frog methods. He says, "But the relative values for the different preparations, for example, Folia Digitalis Titrata and a so-called digitalis pure principle, found on frogs can never be transferred to man."

As to the possibilities offered by the guineapig method for the transference of the results to man, they are about the same as with the frog methods.

The cat method does, however, give results with practically all of the members of the series, which are strictly conformable to the relative activities of the several members for man. Thus, ouabain is nearly twice as active on man as is the average specimen of amorphous strophanthin, and is 1.75 times as active on the cat. Of course it is to be understood that this comparison is between the intravenous doses in both instances, though in both man and cat these two drugs show a similar tendency to great irregularities in rate and degree of absorption from the gastro-intestinal tract.

It has been suggested that, to make allowances for the variabilities found in frogs from one cause or another, each batch be standardized against some uniform and constant preparation. Impurities, variation in strength of different samples of many of the isolated glucosides, and the uncertain keeping qualities of the crude drugs and galenical preparations have limited the choice of the drugs for this purpose to either ouabain or crystalline digitoxin. In view of the profound influence of rate of absorption on the results obtained by the frog tests, the establishment of the reaction of a batch of these animals to either of the "standard" drugs, or even to both of them, does not necessarily give any index of their reactivity toward other members of the digitalis series. It does not even suffice for the testing of digitalis itself to standardize the frogs against digitoxin, for it is generally believed that digitalis owes its activity to other glucosides in addition to its digitoxin content, and that the relative amounts of the several glucosides present is not constant, or the same for any two samples.

The necessity for the similar standardization of the guineapig prior to each series of assays has been urged by Haskell, but it is obvious from the enormous seasonal variations found to exist in these animals that no standard reaction can be obtained, and absorption plays a part here as well as in the case of frogs.

The method of assay should be one which tests that action of the drug upon which its therapeutic use depends. One method does this as well as another, for each depends upon the production of death through the action of the drug upon the heart. Upon this point several have raised objections to the so-called general toxic methods on the cat and guineapig. These objections are not valid for it can be shown that death by either of these methods is due to paralysis of the heart. Reed and Vanderkleed and Githens and Vanderkleed hold this to be true for the guineapig method, and the action in the cat method has been shown to be upon the heart, a point confirmed by the observations of Eckler already cited. The tracing reproduced on page 109 illustrates the truth of this statement, and we have taken a very large number of such tracings, all of which give the same evidence, namely, that death is primarily due to cardiac paralysis, though in some rare instances the heart becomes so weak just prior to its cessation that the circulation is insufficient to maintain a completely normal state of the respiratory center, and these animals show dyspnea and sometimes, even, temporary stoppage of respiration. A further fact which shows that death in the cat is not due to the action of the drug on the respiratory center is that artificial respiration does not alter the dose which is required to cause death, an observation frequently made by us and one which is strikingly shown by the experiments which Eckler made. He found that at most the induction of artificial respiration permitted the injection of an additional c.c. of the ouabain solution, truly an insignificant amount (0.01 mg.) for a cat of several kilos. It might also be mentioned that drugs which act directly and chiefly on the respiratory center to produce death cannot be standardized by biological methods, if death be made the end reaction, on account of the great variability in the reactivity of this central nervous mechanism, at least quantitatively.

The factors of minor importance in the choice of the method for biological standardization of the digitalis bodies are several. The first, and the one which has been invoked against the cat method most often, is the matter of difficulty. The frog methods are very simple in so far as the mere injection is concerned but it requires the exercise of considerable judgment and experience, not to say some knowledge of physiology, to determine exactly when the ventricles may be said to have just come to systolic standstill, and such accurate determination is essential in the one hour frog method. Again, the quantities of the solutions which are used for frogs are so small, and the dilutions relatively so great, that very slight inaccuracy in measurements or in the calibration of instruments are likely to lead to gross variations in the results, which are, at least, confusing to the observer.

The guineapig method is probably the simplest of all of the methods advocated, but its other disadvantages are such as to make it unlikely of adoption.

The cat method is less simple in technique than the others, but it is not so difficult as its critics would have us believe. First, it is said to be very difficult to insert a cannula into the vein of an anæsthetized cat. Our laboratory boys perform this operation readily, and we find that our students experience no great difficulty in learning this simple procedure after only one or two trials.

The question of the maintenance of anesthesia has already been discussed.

The duration of the rate of injection is another stumbling block for our critics. They tend to "make a mountain out of a mole hill" in this matter, for it is really quite simple, with a very limited experience or by reference to previous results, to estimate with reasonable accuracy how rapidly the injection of any given digitalis preparation should be given. For example, if the operator has a tincture of digitalis of unknown strength to test, he may assume that it is of about the average activity, for most tinctures approximate the average. By reference to previous tests he can find that a rough average to be expected would be about 100 mg. per kg. of animal. By diluting the tincture with nine volumes of saline solution he then makes each ten cubic centimetres contain about the expected dose, he then has but to multiply the weight of the cat in kg. by ten and divide by ninety, the theoretically appropriate duration of the injection in minutes, and the resulting figure will be the number of c.c. to be injected per minute. But as we are dealing with an estimated activity of 100 mg. per kg. it is not necessary to go through this elaborate calculation, for the multiplication by 100 at first is about neutralized by the subsequent division of the result by ninety, so that he has merely to inject a number of c.c. per minute equal to one-tenth of the weight of the cat in kg.

After all of this discourse on the exact or approximate estimation of the time of the injection and its rate, I would say that in the years during which the method has been in use in this laboratory injections have been made over periods varying from ten minutes to three or four hours and, save for the likelihood of "running over" in the case of the shorter period, the duration has shown little or no appreciable effect upon the ultimate dose required. It is not to be understood, however, that such wide differences are advocated, they are merely mentioned to show that great nicety in the estimation of the rate of injection is quite unnecessary. All that is required is that the injection shall be slow enough to reduce the likelihood of greatly exceeding the minimum fatal dose and rapid enough to avoid such theoretical factors as the possible excretion of some of the drug or of seriously injuring the heart through prolonged anesthesia. Injections lasting 6 hours have given results somewhat too high.

The cat method has been said to be so time consuming that it is impossible to make a standardization of more than one specimen in a single day. The following is an answer to this contention:

Eight cats were obtained from Ithaca, N. Y., for the sake of testing the reaction of animals from outside of the city.

At 9.00 A.M. the laboratory helper began to weigh the animals and prepare burettes, boards, instruments, etc., for their testing. At the same time an accurate solution of ouabain was prepared. When these preliminaries, including the filling of the 8 burettes, were completed an animal was etherized and tied to a board. While the operator was exposing the femoral vein and inserting the cannula connected with the burette a second cat was being etherized and by the time it had been tied on a board the first injection had been started and a record made of the time on the slip on which the boy had written the weight and description of the animal. In this manner all of the 8 animals were prepared and the injection begun in each, with an average of 7 minutes needed for the complete preparation of each of the animals. It was a very simple matter for the operator, aided by the laboratory boy, to administer a few drops of ether from time to time as the individual animals required, and at the same time to watch and control the rate of the several injections. The results are given in Table 4.

TABLE 4.

STANDARDIZATION OF ITHACA CATS.

Cat	Sex	Weight in Kg.	Duration of injection in minutes	Dose of ouabain Mg. X Kg.
1	f	2.04	72	0.09
2	f	2.38	72	0.09
3	f	2.00	84	0.09
4	m	4.32	71	0.085
5	f	1.47	74	0.098
6	m	1.61	92	0.099
7	f	2.20	83	0.084
8	f	1.44	52	0.110

The total time consumed in the estimations on these 8 cats from the beginning of the first anesthesia to the death of the last animal was one hour and fifty-seven minutes and no special effort was made in the matter of haste. The average duration of injection was 75 minutes and the average dose of ouabain required was 0.093 mg. per kg. of cat weight, a figure only 7 per cent. below the established cat unit. The greatest variation from the average is 18.2 per cent. above, and this was obtained from the only animal which did not seem quite normal before the tests were begun, being considerably depressed and not at all lively or vigorous.

The last animal died at 12.12 P.M., three hours after preparations were begun for the tests, another 20 minutes was required for the calculation of the doses taken by the animals. Three hours and a half may be taken as the extreme limit of time needed for this series of 8 tests.

How does this compare with the other methods as regards the element of time required? The twelve hour frog method, obviously, cannot be done in less than twelve hours. The one hour frog method would require at least 15 minutes for the preparation of the solution and the weighing of the frogs, together with their injection. It usually requires the use of at least three groups of frogs for an accurate determination, each group requiring one hour, the total time for an assay would then scarcely fall within less than three hours and a half.

The guineapig method at best requires an entire day, and Hale found that it often consumed two days for a single assay.

The methods are all humane hence this point needs no comment.

The last minor matter is that of expense. Frogs are the cheapest of the animals but they are prone to die from epidemics of the "red leg disease," and a large number of each consignment is usually female, and most of these are rendered useless by the presence of large masses of eggs, so that it is not probable that an assay by these animals could be done at a cost of less than 50 to 75 cents. Hale found that the guineapig method cost from $2 to $5.50 per assay. In New York City cats cost ten cents each, but in other cities and towns they are more expensive, some reporting that they cost as much as guineapigs. If the factor of cost is so important it would certainly be quite as possible for the large manufacturing houses to breed cats as it is guineapigs, and probably at considerably less cost than in the case of the latter, for their food is cheaper and they do not eat so much. The cat method was originally proposed as one which would be available for the small manufacturer or the retail pharmacist and it would certainly seem that it is still the preferable method for this purpose as it is always a simple matter to secure four to six cats at a small cost and without much trouble, whereas the purchase and keeping of guineapigs and frogs is expensive and troublesome, and the care of both of these animals requires special facilities. Both are liable to destruction by unavoidable factors, frogs by drying, and the "red leg disease," guineapigs by improper food, exposure to draughts, epidemic diseases, and one instance might be mentioned when a large number of these animals were killed in a single night by the invasion of a common rat.

SUMMARY.

1. The frog methods are the cheapest of all.
2. The one hour frog method and the cat method require about the same length of time and are much less time consuming than the guineapig or twelve-hour frog methods.
3. All four methods are humane, there being no preference on this point.
4. The guineapig method is by far the simplest, both of the frog methods and the cat assays requiring some experience and skill.
5. All of the methods test the cardiac action of the specimen, but, other things being equal, those on the higher animals are to

be preferred on account of the greater similarity between these and man; this being especially characteristic of the cat method.

6. The results of the frog methods cannot be transferred to man, not even the results of tests of the relative toxicity of different closely allied bodies. The standing of the guineapig method on this point is much the same. The cat method does give results which are directly transferable to man, both as regards actual toxicity of a single drug and the relative activity of different members of the series.

7. It is not possible to compare different members of the digitalis group by the guineapig or frog methods, owing, principally, to the great influence of absorption on the results obtained by these methods. By the cat method comparisons can be made of the activity of any two or more members of the series wholly regardless of their differences in absorbability.

8. The frog and guineapig methods are limited in their range of applicability by factors of absorption, alcoholic content, etc. This is not the case with the cat method, which has a wide range of applicability.

9. All of the methods are subject to the influence of adventitious factors, the guineapig method being the most affected, the frog the next, and the cat the least. In the latter animal the use of a short series of tests practically nullifies the influence of the adventitious factors.

10. The frog and guineapig methods show moderate to great differences in the evaluations made for the same specimen at different times, and hence cannot be trusted to give correct information concerning the presence or absence of deterioration in a given preparation. The cat method gives concordant results with permanent preparations tested at long intervals and shows the presence of deterioration with certainty.

11. It is possible to obtain reasonably accurate results with any of the methods—to within ten per cent.—but the frog method probably gives the least range of variation in the case of a pure principle, provided that it is soluble in water.

12. The cat method is the only one which affords any evidence of the relative therapeutic value of the different members of the digitalis group.

CONCLUSIONS.

There is no perfect or ideal method of standardizing the members of the digitalis group biologically.

Each of the four methods discussed—the one and twelve-hour frog methods, the guineapig, and cat methods—has certain advantages not possessed by the others.

The method which possesses the greatest number of advantages is the cat method of Hatcher—

(*a*) It is accurate to within ten per cent.

(*b*) It gives constant results from year to year.

(*c*) It provides a means of detecting the presence of deterioration.

(*d*) It is the least affected by adventitious factors.

(*e*) It tests the action of the drug upon which its therapeutic use depends.

(*f*) It is not too difficult for general use.

(*g*) It is neither too time consuming nor too costly.

(*h*) By it widely different preparations can be compared accurately.

(*i*) Its results are transferable to man.

(*j*) It has the widest range of applicability of all the methods.

Neither the frog nor the guineapig method fulfils so many of the essential requirements as does the cat method.

The cat method fails in no single requisite and has far fewer disadvantages than any other method yet proposed.

PROGRESS IN PHARMACY.

A Quarterly Review of Some of the More Interesting Literature Relating to Pharmacy and Materia Medica.

By M. I. Wilbert, Washington, D. C.

An unusual amount of interest is being manifested in the prospective legislation on matters relating to public health and not the least among these several subjects is the legislation designed to effect, either directly or indirectly, the practice of pharmacy. From 38 to 40 of the state legislatures are now in session and in the majority of these bodies some form of legislation more or less directly affecting the practice of pharmacy is being considered.

Legislation designed to further regulate the manufacture and sale of habit forming drugs is being endorsed by physicians and pharmacists generally because of the general appreciation of the need for restrictions of this kind, from a public health point of view, and also because of a natural desire to refute, in a definite and positive way, the repeatedly made claims that medicine and pharmacy, individually or collectively, are at fault in fostering the illegitimate or unnecessary spread of the habitual use of narcotic drugs.

Among the measures that have been introduced to further regulate the sale of drugs of this type no one is of more immediate interest than the bill recently introduced into the House of Representatives by Mr. Harrison, of New York, and generally designated as H. R. 28,277. This bill is in effect a substitute for a previously introduced bill, H. R. 28,023 and contains several features endorsed by representatives of the various National drug associations that recently held a meeting in the City of Washington. The importance of this measure is emphasized by the fact that it is designed to provide a readily available record of all purchases and sales of habit forming drugs and thus to facilitate the enforcement of existing State laws.

The National Drug Trade Conference.—This is the name under which representatives of the American Pharmaceutical Association, The National Association of Retail Druggists, the National Wholesale Druggists' Association, the National Association of Manufacturers of Medicinal Products and the National Association of Pharmaceutical Chemists organized, in the City of Washington, on January 15, 1913, a permanent legislative conference.

The prime object of this conference is to endorse and endeavor to secure greater uniformity in the several State and Federal laws relating to the manufacture and distribution of drugs and medicines of all kinds. The following resolution was adopted as being expressive of the object of the conference:

The National Drug Trade Conference in session in Washington this 15th day of January, 1913, herewith submit by unanimous resolution that this conference is heartily in favor of Federal Legislation of such a nature as to bring under control the importation and the interstate traffic in so-called habit-forming drugs in such a measure as to prevent their illegitimate use without placing unnecessary burdens upon the manufacturer, jobber, retailer, or physician.

Publicity and the Practice of Medicine.—An editorial (*J. Am.*

M. Assoc., 1913, v. 60, p. 375) in commenting on the inevitable requirement for greater publicity in connection with the practice of medicine says: "The American public has already awakened to the fact that the prescribing of fraudulent or unscientific proprietary mixtures by physicians is an evil but one degree removed from that of self dosing with patent medicines. The sooner the medical profession realizes this the better it will be for its own dignity and scientific standing.

Proprietary Medicines.—In England the Select Committee on Patent Medicines is still collecting evidence for and against the continuance of privileges accorded to this class of medicinal preparations. A report (*Chem. and Drug.*, 1913, v. 82, p. 54) of the session held on January 23 is not particularly inspiring and should go far to convince the members of the committee that the methods and the ideals of at least many manufacturers of patent medicines are not designed to further the best interests of the public.

Classification of Medical Colleges.—The Council on Medical Education (*J. Am. M. Assoc.*, 1913, v. 60, pp. 231–234) presents the third classification of the medical colleges of the United States with an outline of the basis on which the classification was made. While it is true that considerable opposition has been encountered to the work of the Council the rapidly growing list of class A schools evidences the fact that the work of the Council on Medical Education has been productive of good results and that the whole plane of medical education in this country has been and is being rapidly raised. From a pharmaceutical point of view the results that have been attained should not, and in effect cannot be ignored as it is but a matter of time when pharmaceutical schools will be measured by the achievements that have been recorded for medical schools.

Ph. Germ. V.—Taub, L. (*Ztschr. f. ang. Chem., Pharm. Ztg.*, 1912, v. 57, p. 886), in a comprehensive review of the evolution of the Prussian and succeeding German Pharmacopœias presents tables showing the date of publication and the number of titles contained in these several books. The first edition of the Prussian Pharmacopœia, published in 1799, is reported to have contained a total of 685 titles, while the now official pharmacopœia contains 638 titles. The maximum number of titles was reached by the Ph. Germ. I, published in 1872, which contained 896 titles. This was reduced, however, in the Ph. Germ. II to 592, while the edition of the German Pharmacopœia published in 1890 contained the least number of titles reported: 591.

Ph. Brit.—Sir Donald MacAlister, the president of the General Medical Council of Great Britain, in a recent address stated that the Pharmacopœia Committee with the help of its editors had prepared for the press the draft of four large sections of the text for the new British Pharmacopœia. It was hoped that the first proofs might be ready for submission to the committee early in the new year, and that thereafter the work that still remained to be done would be rapidly advanced. (*Brit. and Col. Drug.*, 1912, v. 62, p. 467.)

Ph. Belg. III.—The Journal de Pharmacie d'Anvers (1912, v. 68, pp. 646–670) reprints the proposed supplement to the Ph. Belg. III prepared by the permanent pharmacopœia commission. The descriptions are provisionally offered so that pharmacists may have an opportunity to present criticisms. The provisional text includes descriptions for 28 articles; 18 chemicals, 9 preparations and 1 drug, coca.

Brussels Conference.—A reply to a query (*J. Am. M. Assoc.*, 1912, v. 59, p. 2175) calls renewed attention to the Brussels Conference and the international treaty on uniformity of pharmacopœial formulæ for potent medicaments and points out that in practically all of the Countries of Europe where the National Pharmacopœias have been revised, the provisions of the treaty have been closely adhered to. The total number of compliances with article 1 of the original protocol has been increased from 129 in 1902 to 260 in 1910, while the non-compliances have been reduced from 131 in 1902 to 15 in 1910; the present U. S. P. being responsible for no less than 5 of the latter.

Light and Drugs.—An editorial (*J. Am. Med. Assoc.*, 1912, v. 59, p. 2160) calls attention to the observations of Neuberg, who found that nearly all types of organic compounds acquire a pronounced photosensitiveness when they are mixed with certain inorganic compounds. Iron salts, for instance, provoke this effect most strikingly; and the phenomena of change induced by the presence of such sensitizing substances fail to evince themselves so long as the solutions containing them are kept in the dark. Many familiar drug preparations represent combinations of organic compounds and metallic elements and the obvious outcome of the observations so far recorded by Neuberg and others is that preparations containing metallic components should be preserved in dry form if possible and in any event they should be kept in dark containers and protected against light.

Outline of Micro-analytical Methods for Food and Drugs Laboratories.—Schneider, Albert (*J. Am. Pharm. Assoc.*, 1912, v. 1, pp. 1330–1338) discusses the value of the compound microscope as a ready means for determining the identity, quality and purity of foods and drugs, and outlines the methods of procedure.

Some Commercial Samples of Drugs.—Linton, A. W. (*J. Am. Pharm. Assoc.*, 1913, v. 2, pp. 30–35), reports the examination of a number of samples of asafetida, ammoniac, myrrh, gamboge, guaiac, benzoin and lycopodium and concludes that ash standards might well be established for an additional number of drugs, other than those for which they are at present stated, but a method of procedure should be outlined.

The Alcohol Requirement of the Pure Food and Drug Law and the Accuracy of Alcohol Assays of Pharmaceutical Preparations.—C. H. Briggs. (*J. Ind. Eng. Chem.*, 1913, v. 5, pp. 29–30.)—In the making of alcohol assays there are several sources of error and the result may be off 1 per cent. or 1.5 per cent. alcohol. Briggs believes that a ruling to the effect that fluid extracts and elixirs could be labelled with maximum content of alcohol would be just and fair and would not in any way deflect the real intent of the Drug Law.

Wood Alcohol Poisoning.—Casey A. Wood (*J. Am. M. Assoc.*, 1912, v. 59, pp. 1962–1966) calls renewed attention to the danger of death and blindness from wood alcohol poisoning and points out that 30 years ago poisoning from wood alcohol was practically unknown. With the elimination of the disgusting odor and vile taste of the preparation as then known and the introduction of the refined product, under various trade names, the preparation began to have more extended use and was freely advertised as a harmless and efficient substitute for grain alcohol, and is even now, freely sold in drug stores not infrequently to the exclusion of the less objectionable denatured alcohol.

Asafetida.—An editorial (*Chem. and Drug.*, 1912, v. 81, p. 51) states that the continued rejection of asafetida by the United States

Customs is causing considerable trouble on the London market and the drug has the reputation of being the most difficult to handle so far as imports into the United States are concerned. It is now proposed to accept asafetida on the basis of a lead number, the equivalent of the amount of metallic lead, in milligrams that is used up by a 1 gram sample of ether purified resin.

The lead numbers obtained from various resinous products, according to Merrill are: Asafetida, 222; galbanum, 4; ammoniacum, 75; olibanum, 0; guaiacum, 171; myrrh, 7; colophony, 142; sandarac, 351; mastic, 34; gamboge, 9.

Ernest J. Parry.—(*Chem. and Drug.*, 1913, v. 83, p. 180.) Condemns the proposed "lead value" for the ether soluble resin of asafetida and expresses the belief that there is no authority for assuming that 220 or thereabouts represents even the approximate value of genuine asafetida. Reports on 5 samples vary from 144 to 172 and the suggestion is made that in the event that a lead number of 200 be insisted on no dealer will venture to ship asafetida to the United States.

Buchus.—Harold R. Jensen (*Pharm. J.*, 1913, v. 90, pp. 60–61) reports a comparative study of *Barosma venusta* and of *B. betulina* and *B. serratifolia* and concludes that neither the leaf nor the oil of the former can be expected to clinically replace either of the latter varieties of Barosma.

Calcium Glycerophosphate.—The Council on Pharmacy and Chemistry (*J. Am. M. Assoc.*, 1913, v. 60, p. 45) describes Calcium glycerophosphate as the monohydrated normal calcium salt of glycerophosphoric acid, containing not less than 90 per cent. of anhydrous calcium glycerophosphate. It occurs as a fine white powder, odorless and almost tasteless; somewhat hygroscopic, slightly soluble in water and almost insoluble in hot water and insoluble in alcohol or ether. An aqueous solution is alkaline to litmus paper.

Caulophyllum.—Power and Salway (*Chem. and Drug.*, 1913, v. 82, pp. 202–203). *Caulophyllum thalictroides* was found to contain two crystalline glucosides possessing the character of Saponins. The glucoside occurring in predominating amounts is identical with Lloyds "Leontin" but as it has now been more fully studied the name caulosaponin is proposed for this product and caulophyllosaponin for the accompanying glucoside.

Cresol Preparations.—Raschig, F. (*Südd. Apoth.-Ztg.*, 1912, v. 52, p. 670), states that J. Schenkel was the first to discover the crude tar distillates, containing approximately 33 per cent. of phenols, could be made miscible with water by the addition of rosin soap. Schenkel marketed a preparation of this kind under the name "Sapokarbol II." This was subsequently imitated by other manufacturers and under the name "Creolin" or "sheep-dip" has found a widespread application and for some purposes it is claimed to be more efficient than the corresponding soap solution of cresol.

Cycloform.—Is the name applied to isobutyl para-aminobenzoate or para-aminobenzoic acid isobutyl ester. It occurs as a fine white, crystalline, odorless powder that is soluble in ether, benzol, acetone, alcohol and olive oil but is only slightly soluble in water. It melts at 65°. Cycloform acts on wound surfaces and mucous membranes as a superficial and prolonged anæsthetic and as a mild antiseptic. (*J. Am. Med. Assoc.*, 1912, v. 59, p. 2150.)

Digitalis Preparations and Some of the New Substitutes for them.—An editorial (*J. Am. Med. Assoc.*, 1912, v. 59, pp. 2074–2075) calls attention to a report from the Pharmacological Laboratories at Cambridge, England, which reiterates the frequently made statement that so far not one of the new, generally proprietary, preparations of digitalis has made a successful bid for superiority over an active tincture of digitalis. (See also *Ibid.*, 1913, v. 60, p. 143.)

Digitalis.—Hatcher and Eggleston (*J. Am. M. Assoc.*, 1913, v. 60, pp. 499–503) report a study of the relative emetic and cardiac activities of the more commonly used digitalis bodies in which they call attention to their previously reported observation that the emesis sometimes produced by digitalis bodies is due mainly, if not entirely to the action on the vomiting center in the medulla and conclude that we at present have no means of securing the cardiac action of the digitalis bodies without subjecting the vomiting center to their influence at the same time. (See also *Ibid.*, p. 371.)

Elarson.—A new arsenic preparation containing strontium and chlorine, occurs as a nearly colorless and odorless amorphous powder, insoluble in water but slightly soluble in alcohol, ether and fatty oils. Elarson contains 13 per cent. arsenic and 6 per cent. chlorine. (*Suedd. Apoth. Ztg.*, 1913, v. 53, p. 20.)

Epinephrine from the Whale.—An editorial (*J. Am. M. Assoc.*, 1912, v. 59, p. 2263) calls attention to a paper by Weidlein on the adrenal glands of the whale, which were found to be about five hundred times as large as the corresponding glands of sheep and fifty times as large as the glands from cattle. The yield of epinephrine is proportional to that hitherto obtained from other animals, so that as much as 1.2 gm. of the typical active principle has been isolated from a single whale adrenal gland.

Glycerin.—An editorial (*Chem. and Drug.*, 1912, v. 81, p. 752) states that the chief use for glycerin is in the manufacture of dynamite for explosive purposes. Among the rapidly developing uses for high explosives not the least important is its use for ploughing.

Glycotauro is the name applied to a purified ox bile standardized to contain 50 per cent. of bile salts free from bile pigments. Each 1 gm. represents approximately 10 c.c. of fresh ox bile. Glycotauro occurs as a soft, semi-solid mass of light brown color, bile-like odor and slightly bitterish taste. It is readily soluble in water and in alcohol. (*J. Am. Med. Assoc.*, 1912, v. 59, p. 2066.)

Hediosit is the lactone or inner anhydride of alpha-glucoheptonic acid. It is prepared by treating glucose with hydrocyanic acid the condensation product being treated with barium hydroxide and the lactone of alpha-glucoheptonic acid liberated by the addition of sulphuric acid. Hediosit is a white, crystalline, odorless powder possessing a sweet taste, it is readily soluble in water, slightly soluble in alcohol and almost insoluble in ether. The aqueous solution is acid toward litmus. It is said not to be poisonous and is given in doses of from 10 to 30 gm. (*J. Am. M. Assoc.*, 1913, v. 60, p. 516.)

Heroin, Facts About.—An editorial (*J. Am. M. Assoc.*, 1912, v. 59, pp. 2262–2263) points out that although heroin and its hydrochloride have been in use but a few years, they have already established themselves among the habit forming drugs and have become sufficiently conspicuous in this respect to awaken the thinking public to the deplorable results for which they may become responsible. See also article by John Philips, *Ibid.*, 1912, v. 59, pp. 2146–2147.

Hexal is the name applied to hexamethylenamine salicylsulphonic acid. It is prepared by the interaction of an alcoholic solution of salicylsulphonic acid and an aqueous solution of hexamethylenamine. Hexal occurs as a white, odorless crystalline powder, readily soluble in water, slightly soluble in alcohol and difficultly soluble in ether. It is claimed that hexal has the action of hexamethylenamine combined with an anæsthetic and astringent action due to the salicylsulphonic acid. It is given in doses 1 gm. (15 grains) three to six times a day. (*J. Am. M. Assoc.*, 1912, v. 59, p. 1971.)

Ipecac in Dysentery.—Harvey G. Beck (*J. Am. M. Assoc.*, 1912, v. 59, pp. 2110–2114) reports a review of some of the literature on the treatment of dysentery by means of ipecac and reports a number of cases to show that ipecac when administered through a duodenal tube is distinctly more efficacious than when administered in any other way.

Isatophan is methoxy-atophan and occurs as a lemon-yellow crystalline powder melting at 216°. It is soluble in alcohol and alkalies but insoluble in water or ether. It is practically tasteless but possesses a slight odor resembling atophan. (*J. Am. M. Assoc.*, 1913, v. 60, p. 516.)

Neosalvarsan.—P. Ehrlich is reported as stating that at the present time it is not possible to decide whether neosalvarsan is to be given the preference over salvarsan or not. Exposed to the air neosalvarsan is more readily decomposed and the oxidation products appear to be even more toxic than are those of salvarsan. The untoward results that have been reported in connection with salvarsan Ehrlich attributes to the use of impure water, or distilled water that has been kept in lead containing glass vessels. (*Pharm. Zentralh.*, 1912, v. 53, p. 1220.)

Novatophan is described by the Council on Pharmacy and Chemistry as the ethyl ester of paratophan. It occurs as a slightly yellow, odorless and tasteless, crystalline powder that melts at 76° and is insoluble in water but readily soluble in alkalies, hot alcohol and strong acids. Its uses and doses are the same as atophan. (*J. Am. Med. Assoc.*, 1912, p. 59, p. 1971.)

Oil of Theobroma, Adulterations of.—Duyk (*Ann. chim. anal.*, 1912, v. 17, pp. 405–407) states that cacao butter is very frequently adulterated with other fats, the fraudulent additions being chiefly butter of cocoa nut, and less frequently green butter, the butter of Dika and of Illipé, wax, spermaceti, margarine and paraffine.

Primula Dermatitis.—H. A. Sharpe (*J. Am. M. Assoc.*, 1912,

v. 59, pp. 2148–2149) reports 4 cases of primrose dermatitis caused by the flowers of the wild primrose, *Primula farinosa,* Linné, which grows wild throughout the southern part of Wisconsin, Minnesota, Michigan and northern Illinois.

Salicylates, Relative Value of Natural and Synthetic.—Cary Eggleston (*J. Am. M. Assoc.,* 1912, v. 59, pp. 2057–2064) reports a comprehensive study of the literature on the relative toxicity of natural and of synthetic salicylates in an effort to locate definitely the reasons for the belief if reasons are to be found. He presents rather a comprehensive reflection of the literature and concludes that the evidence in favor of the "natural" salicylates is extremely slight, the bulk of the evidence indicating that physicians all over the world have demonstrated the artificial salicylates to be quite as effective as the "natural" and no more liable to produce unfavorable actions under similar conditions.

Salvarsan Solutions.—Adolf Jaiser (*Südd. Apoth. Ztg.,* 1912, v. 52, p. 726). The occurrence of thromboses following the intravenous injection of solutions of salvarsan prompted an inquiry which revealed the fact that the manufacturers have revised their system of control numbers so that it is no longer possible to distinguish the comparative date of manufacture. It was also observed that the physical properties of different samples of salvarsan varied widely.

Sodium Glycerophosphate.—The Council on Pharmacy and Chemistry (*J. Am. M. Assoc.,* 1913, v. 60, p. 442) describes sodium glycerophosphate as occurring in white monoclinic plates or scales, having a saline taste; odorless; easily soluble in cold and hot water; nearly insoluble in alcohol and containing not less than 99 per cent. of hydrated sodium glycerophosphate, with 5.5 molecules of water of crystallization.

Solidified Fixed Oils.—Aufrecht (*Pharm. Ztg.,* 1912, v. 57, pp 876–877) discusses the several processes of hydration that are being employed and points out that the most satisfactory results appear to have been obtained by catalytic processes, using nickel and palladium as the catalizing agents. While any fixed oil can be used, sesame oil, peanut oil, cottonseed oil, and castor oil have been experimented with most extensively. The chemical changes brought about are evidently due to the hydration of the unsaturated fatty acids, the iodine number being reduced to 3.9 per cent. corresponding to approximately 4.4 per cent. of oleic acid. The specific gravity of hydrated oil varies from 0.9252 to 0.9268 at 15° C. The melting point varies from 44.5° to 46.5° and the fat is readily saponified on boiling with alkalies.

Sulphuric Acid Caustic Pastes.—Pussey, W. A. (*J. Am. M. Assoc.*, 1913, v. 60, pp. 434–435), discusses the use and the formulas of sulphuric acid caustic pastes and notes that while a sulphuric acid paste may be effectively used for destroying lesions in the skin it is not a desirable agent when one needs to consider cosmetic effects. See also p. 462.

Thyroid Gland Preparations.—An editorial (*J. Am. M. Assoc.*, 1912, v. 59, p. 1980) notes that the products available in the form of desiccated thyroid are derived from several of the slaughter house animals, notably sheep, and the commercial preparations are frequently standardized in terms of their content of iodine. The glands of hogs are usually richest in iodine and their selection for therapeutic purposes appears decidedly rational, at least, so far as known, there is no occasion to reject the hog products.

Vanadium Preparations.—The Council on Pharmacy and Chemistry (*J. Am. M. Assoc.*, 1913, v. 60, p. 225) reports on a number of proprietary preparations containing vanadium and concludes that the manufacturer of these preparations has not submitted reliable evidence to substantiate the therapeutic claims that are being made for them. While vanadium itself may possibly have uses in medicine such uses, up to the present time at least, have not been firmly established.

THE MICROSCOPICAL EXAMINATION OF VEGETABLE PRODUCTS AS AN ADJUNCT TO THEIR CHEMICAL ANALYSIS.[1]

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In solving the problems of man and nature the analytical chemist too often limits himself to chemical or physico-chemical methods. He is an analytical chemist in the strict sense of the word and not an analyst, which implies a man of broader training and experience, utilizing the principles of other sciences as means to his end. He turns his back on the methods of vegetable and animal histology, physiology and bacteriology, asserting with satisfaction that he is a specialist and as such must limit his field of activity.

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[1] Reprinted from original communications, Eighth International Congress of Applied Chemistry. Vol. xviii, pp. 361-366.

This attitude of the analytical chemist may be traced to a misapprehension as to the province of a specialist. Such a worker must be limited only in the field of application and not in training or the methods employed. An oculist, for example, limits himself to defects of vision and diseases of the eye and allied organs, but in order to properly carry out the work of his specialty he must have broad medical training and be conversant with the general principles of optics, bacteriology, chemistry and perhaps other sciences. Specialists in other sciences, both pure and applied, must also have good general training if they are to achieve distinction in their limited fields; otherwise they are in much the same position as the mechanic who, instead of mastering his trade, learns to operate one machine, thus becoming a mere automaton.

Botany and chemistry are generally considered incompatibles. The student of chemistry sometimes takes up bacteriology as a minor subject, but comparatively seldom studies advanced botany, even though he intends to specialize in food analysis, textile chemistry, paper technology or some other subject dealing chiefly with materials of vegetable origin. No physiological chemist would think of pursuing his investigation of animal materials without a working knowledge of animal anatomy, yet agricultural and food analysts and others dealing with vegetable materials too often limit themselves to a knowledge of chemical constituents, ignoring the relation of composition to histological structure.

This is most remarkable, since the methods of vegetable histology, as well as of chemistry, are invaluable in solving problems relating to the nature or constituents of foods, drugs, fibres and other products of vegetable origin. Sometimes one line of investigation alone is useful, sometimes the other, but often each throws some light on the subject, and the corroboratory results obtained by such widely differing means furnish an indisputable chain of evidence.

Let us look more closely into the nature and relation of these two applied analytical sciences.

Chemical analysis deals with chemical constituents; microscopical analysis deals largely with the form of some of these constituents. Chemical analysis determines the amount of fibre, starch, protein, oil, etc.; microscopical analysis determines the shape, size, and other characteristics of the cells and cell contents. Chemical analysis usually stops with the mere determination of the amount of chemical constituents; microscopical analysis goes further and names the particular product from which they were derived. Chemical analysis answers a question only in scientific terms; microscopical analysis, in terms which all can understand.

In many cases, the best idea of a material is gained by following out both lines of investigation. By chemical analysis we learn the percentage of protein, fiber, starch, etc., but not the ingredients from which they were derived; by microscopical analysis we learn the ingredients, but usually gain only an approximate idea of their proportion. Given the results of both analyses, we may often calculate with some exactness the percentage of the different materials present.

If, for example, we find in a sample of wheat bran 11 instead of 16 per cent. of protein, and 15 instead of 8 per cent. of fiber, we know it is not pure bran but we do not know the adulterant; if we find corn-cob tissues under the microscope, we learn the adulterant but not the amount. Knowing that the material is a mixture of bran and ground corn-cob, and knowing the average percentage of protein and fiber in both, we are in a position to calculate from the results of the chemical analysis the relative amounts of these ingredients.

Again, if we find in ground mace 40 per cent. instead of 20 per cent. of fixed oil, we know it is not pure mace; if we find under the microscope a large amount of tissues of the Bombay mace, a material worthless as a spice containing about 60 per cent. of fixed oil, we learn the adulterant. Knowing all this, and knowing the average percentage of oil in true mace and Bombay mace, we have the data for calculating roughly the percentage of each in the mixture.

Still again, if in a textile fabric we find a certain percentage of organic fiber insoluble in boiling alkali, we know that the fabric is not all wool. If under the microscope we identify this insoluble fiber as cotton, we have found the missing link in the chain of evidence.

In the analysis of complicated mixtures, we must often rely entirely on microscopical examination. For example, chemical analysis of a mixture of wheat, buckwheat and corn flours gives us little information, and it is only after the characteristic starch granules and tissues of each have been found under the microscope that we gain a definite idea of the nature of the constituents.

Again, in the examination of paper, the microscope is our sole dependence in learning the nature and approximate percentages of the fibers employed, chemical analysis serving merely to determine the kind and amount of sizing, coating and other non-fibrous constituents.

Among some condimental cattle foods examined by the writer some time since was one, the chemical analysis of which disclosed but one proximate constituent, viz., common salt; the microscope, however, disclosed linseed meal, corn meal, wheat feed, mustard hulls, cocoa shells, malt sprouts, fenugreek and turmeric. In such a case, dependence must be placed entirely on the microscope, except for mineral ingredients.

Chemical analysis of another sample demonstrated the presence of ground bone, carbonate of lime, iron oxide and free sulphur; microscopical examination disclosed linseed meal, wheat feed and charcoal. This is a striking example of a material in which half the constituents (all mineral) can only be detected by chemical analysis; the other half (all vegetable) by the microscope.

Many other equally striking examples of the interdependence of these two applied analytical sciences might be cited.

The point now arises as to who is to carry on these two lines of investigation so different in details but so similar in purpose.

One plan is for a chemist to make the chemical analysis and a botanist the microscopical examination. This plan has the advantage that each can confine his attention to one specialty, but it had the disadvantage that the close partnership between the two, which is essential to the best results, outside of large institutions, is both difficult and expensive. Such a division of labor would usually be as impracticable as to divide the work of a chemical laboratory between a chemist and a physicist, the former conducting the precipitations and other chemical processes, the latter, polarizations, determinations of specific gravity, refractive index and the like.

The rational plan is for one man to master both lines of research. Such a man need not execute all the details, but he should be thoroughly acquainted with them and should interpret the results. We will call him an analyst, not a chemist or a botanist, and his laboratory an analytical laboratory, not a chemical or botanical laboratory. His equipment should consist of the necessary apparatus for a wide variety of chemical work and a complete microscopical outfit, including micro-reagents and a set of standard specimens of economic seeds, roots, barks, fibers, woods, etc.

But in order to have workers in this field, we must have suitable courses of instruction in our schools of science. The subject has a recognized place in many continental universities, particularly in the schools of medicine, pharmacy and hygiene, but outside of a few institutions, receives little attention in America.

The student who seeks to prepare himself for this field should take both chemical and botanical studies. In chemistry, he should study the branches taught in a well-regulated chemical course—elementary chemistry, qualitative and quantitative analysis, organic and physical chemistry, and so on. In botany he should take up successively elementary botany, systematic botany (at least of the phanerogams) and vegetable anatomy and physiology. These studies are all on the curriculum of every college and school of technology, although the student of chemistry does not usually take all the botanical studies named. Without a certain amount of botanical training, however, a chemist is no more fitted to take up microscopical analysis than a botanist without chemical training is fitted to work at quantitative analysis.

After his preliminary studies in chemistry and botany, the student is ready to take up a course in the methods for the chemical and microscopical examination of the various raw materials and of the products derived from them. This course should be so arranged that the student will carry along his chemical and histological practice side by side, as he must do afterwards in practical work. For example, in studying the cereal grains, he should devote part of his time to the methods of determining water, ash (including ash analysis), protein, fiber, starch, fat, pantosans, etc., and another part to a systematic study of the starches and the histological elements of the bran coats both in sections and in powdered form. In like manner, he should take up a chemical and histological study of leguminous seeds, oil seeds, spices, tea, coffee, cocoa, drugs, fibers, etc.

His work in the chemical laboratory should teach him not only the strictly chemical methods but also the use of the polariscope, the spectroscope and other physical apparatus, and his microscopical instruction should fit him not only to differentiate organized forms but other characteristic elements, such as fat crystals, mineral crystals, and the like.

After such a course, he should be able not only to undertake investigations in physiological or plant chemistry but also the laboratory work of an official food department or a custom house, a flour mill, a brewery, a sugar refinery, a candy works, a fruit cannery, a drug mill, a textile mill, a paper mill, etc.

It is my firm belief that courses similar to that outlined should be conducted in all our leading universities and schools of technology, and the student should be taught the use of the microscope in conjunction with the balance in solving the analytical problems which every day become more numerous and intricate.

CORRESPONDENCE.

AN HISTORICAL MEDICAL EXHIBITION IN LONDON.

For the first time in 21 years the International Medical Congress will meet in London in the summer of 1913, and, in this connection, an exhibition of rare and curious objects relating to Medicine, Chemistry, Pharmacy and the allied sciences is being organized by Mr. Henry S. Wellcome. The response to the appeal for loans has been most successful, with the result that probably one of the most interesting collections of historical medical objects ever gathered together will be on exhibition during the meeting of the Congress.

Among other interesting sections is one including the medical deities of savage, barbaric and other primitive peoples. Through the kindness of friends, specimens of these have been forwarded from all parts of the globe, but there are still many gaps to be filled, and those who possess such objects, and would be willing to loan them, should communicate with the Secretary of the Exhibition, whose address is given below.

Amulets, talismans and charms connected with the art of healing will also form another prominent feature and any loans of this description would be welcomed.

In the section of surgery, an endeavor will be made to trace the evolution and development of the chief instruments in use at the present day, and it is desired to accumulate specimens of instruments used in every part of the world by both savage and civilized peoples.

In pharmacy and in botany special exhibits are projected, which will include models of ancient pharmacies, laboratories and curious relics of the practice of alchemy in early times. Specimens of ancient and unusual materia medica from all parts of the world will also be exhibited.

A complete, illustrated syllabus will be forwarded to anyone interested on application to the Secretary, 54a, Wigmore Street, London, W. England.

Dear Sir:

The Council on Pharmacy and Chemistry has appointed a Committee on Therapeutic Research, to encourage and assist the investigation of problems which promise to have some direct practical bearing on Therapeutics; especially such problems as require collaboration. The enclosed reprint will give you some idea of the objects of this committee.

The Committee would be pleased to receive suggestions from you; and if you should be doing or planning any work along this general line, the Committee would be glad to extend any assistance in its power. It would also invite your attention to the enclosed suggestive list of problems which appear to merit investigation. Perhaps you may find there some topic which would interest you or your colleagues. It is planned to entrust the responsibility for each investigation to experienced men who will be free to plan and conduct the research, select their collaborators, and publish the results. A limited fund has been appropriated by the Association for materials and technical assistance. The results may be reprinted in the "Reports" of the Council, or in special monographs devoted to each subject.

Respectfully yours,

Torald Sollmann, *Chairman,*
David L. Edsall,
R. A. Hatcher,
W. A. Puckner, *Secretary*, 535 Dearborn Ave, Chicago, Ill.

The Committee has published a list of problems suggested for therapeutic investigation. Some of the subjects which are under investigation are the following:

Antiseptics and Germicides: Standardization.

Antiseptics, Intestinal: Efficiency of.

Cardiovascular Drugs: Detailed study of clinical actions by modern methods.

Chloroform: Effects of Impurities.

Digitalis Group: Cumulative action and absorption.

Iodides, relative efficiency and side effects of organic and inorganic.

Phosphorus Compounds: Critical literature.

Salicylates: Causes of idiosyncrasy.

Salicylates: Comparison of natural and synthetic.

[Editor.]

BOOK REVIEWS.

Jahresbericht der Pharmazie, herausgegeben vom Deutschen Apotheker Verein. Bearbeitet von Dr. Heinr. Beckurts unter Mitwirkung von Dr. H. Frerichs und Dr. H. Emde. 46 Jahrgang, 1911, Göttingen, Vandenhoeck & Ruprecht, 1912.

It is by no means presumptuous to assume that pharmacists who are at all conversant with the German language or with German pharmaceutical literature are also more or less familiar with the Jahresbericht der Pharmazie. To pharmacists who know the book it will perhaps not be necessary to say that the Jahresbericht for 1911 is fully equal to its predecessors. On the other hand, it would be futile to attempt to describe to pharmacists who are not familiar with the volumes of this widely known annual review of the literature of pharmacy, such a wonderfully comprehensive fund of information in the course of an ordinary book review. As a matter of record it will suffice therefore to state that the " Jahresbericht " for 1911 contains a total of 547 octavo pages, no less than 67 of which are devoted to a comprehensive double and in part triple column index, including approximately 8,000 references. In conformity with previous volumes the material is arranged under the general headings: I, Pharmacognosy; II, Pharmaceutical chemistry; III, Organotherapeutic and serum preparations; IV, Galenical preparations; V, Medical chemistry; VI, Chemistry of foods; VII, Toxicological chemistry. These several sections are followed by a reflection of the permanent literature, on pharmacy, of the year 1911, and the very complete and comprehensive index referred to above. An occasional typographical error, particularly in connection with the names of American authors, is somewhat annoying and may prove misleading to future generations of pharmaceutical workers who may have occasion to look up the recorded work of any one individual. Aside from comparatively few shortcomings in this direction, however, the book is a really valuable contribution to the literature of pharmacy and as a book of references will be consulted for many years to come.

M. I. W.

DIGEST OF LAWS AND REGULATIONS IN FORCE IN THE UNITED STATES RELATING TO THE POSSESSION, USE, SALE AND MANUFACTURE OF POISONS AND HABIT-FORMING DRUGS. By Martin I. Wilbert and Murray Galt Motter. Prepared by direction of the Surgeon General. Washington, Government Printing Office, 1912.

This publication appears as Public Health Bulletin No. 56 and is evidently one of a series of Bulletins designed to present a comparative reflection of laws bearing on public health problems. Previous publications enumerated in the list of "Public Health Bulletins" include: Analysis of the laws and regulations relating to the organization powers and duties of health authorities: An analysis of the laws and regulations relating to vaccination: An analysis of the laws and regulations relating to ophthalmia neonatorum; and: A digest of the laws and regulations relating to the reporting of cases of sickness. The present publication is of immediate and direct interest to pharmacists and emphasizes, more than any one other available publication the pressing need for greater uniformity in Federal and State laws relating to the manufacture, sale and use of poisons and habit-forming drugs as well as a correlation of the food and drug laws designed to restrict the sale of articles that may contain or be contaminated with substances that can properly be considered as being poisonous or deleterious in any form.

Some idea regarding the comprehensiveness of the contained material may be had from the following list of tables that are included in the Introduction:

Table showing comparative number of cases of suicide and the number of deaths from acute and chronic poisoning and from alcoholism in the registration area, 1900 to 1910.

List of general definitions embodied in the laws designed to restrict the sale of poisons.

List of substances enumerated in the laws designed to restrict the sale of poisons.

Table showing the requirements embodied in the laws designed to restrict the sale of poisons.

Table showing requirements relating to the practice of pharmacy, embodied in the several laws regulating the sale of poisons and narcotics.

Table showing the requirements embodied in the laws designed to restrict the sale and use of cocaine and narcotics.

Table showing the requirements relating to poisons and narcotics embodied in the several food and drug laws.

Table showing the requirements embodied in laws designed to restrict occupational intoxications.

The tables are followed by abstracts and references to Federal, State and Municipal laws and regulations relating to the subject matter of the Bulletin. The abstracts, in turn, are arranged uniformly under the headings: Sale and use of poisons: Sale and use of cocaine and narcotics: Drugs to be announced on label: Poisons in articles of commerce: Occupational intoxications: Methyl alcohol: Sale and use of intoxicating liquors: Practice of Pharmacy: and: Standards for drugs. All of the contained material is reviewed in a comparative way in an analytical index of 18 double column pages. As pointed out in the introductory paragraphs of this Bulletin the health and life destroying influences of poisonous substances are a more potent factor in undermining the public health than is generally appreciated or even suspected, despite the more than 8,000 deaths annually reported as being directly due to the ingestion or inhalation of poisonous substances. The material presented in the 278 pages of the pamphlet under discussion should be the cause for a public awakening to the possible dangers from the promiscuous sale and use of poisonous substances and the Bulletin should serve to direct the attention of druggists generally to the shortcomings evidenced in the several State laws, and lead them to insist that the safeguards for the protection of the health and lives of the public should be improved and strengthened and having done this they should insist that the laws be strictly enforced so that every death due to the ingestion or use of a poisonous substance be thoroughly investigated and the blame fixed on the person or persons whose laxity in selling or handling the poisonous compounds is at fault.

Copies of this Bulletin, to the limit of the edition, for free distribution, may be obtained by addressing the "Surgeon General, U. S. Public Health Service, Washington, D. C." Additional copies of the publication may be procured from the "Superintendent of Documents, Government Printing Office, Washington, D. C.," at 25 cents per copy.

EWEN McINTYRE.[1]

Honorary President, College of Pharmacy of the City of New York.[2]

In the death of Mr. Ewen McIntyre, which occurred on Wednesday, January 8, at his residence, 303 West 74 Street, the College of Pharmacy suffers one of the most severe and painful losses in its history. Mr. McIntyre was the oldest living graduate of this School, being a member of the class of 1847. He became a trustee of the College in 1873, vice-president in 1874 and president in 1876, in which office he continued until 1889. He then again entered the board of trustees, in which position he continued until 1892. In 1904 he was elected honorary president and continued to fill this office until the occurrence of his death.

Mr. McIntyre was one of the oldest living pharmacists of this city, if not actually the oldest. When he established his pharmacy at 18th Street and Broadway, his friends considered him reckless in moving so far out of the city, where residents were few and scattered. At that time little could be seen from his front door except pasture fields, enclosed by rail fences. During that period of small beginnings, he achieved business success by his habits of economy and industry, and prepared himself to take full advantage of the larger opportunities which came with the upward growth of the city. He withstood successfully all financial storms and scored a continuous success, retaining to the last his ownership of the valuable commercial site where he originally located, an act that well illustrates the habit of persistency and permanency that characterized his entire life.

His high and influential position in pharmacy, national as well as local, did not cease with his retirement from active business, but continued without intermission until his death, which met him as honorary president of the American Pharmaceutical Association.

His commercial honesty and honor were of the sterling and severe type of a former generation. His entire professional record fails to disclose any act which could be justly characterized as dishonorable or unprofessional. He was recognized far beyond the limits of the pharmaceutical world as a business man of sound credit and one whose word could be trusted to the uttermost, and in this way he will be remembered by thousands who survive him. To the physicians of this city, Mr. McIntyre has always been known as a pharmacist who respected the proper relations between the two professions and who represented the highest ideals and excellence in pharmaceutical practice.

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[1] Reprinted from *Columbia University Quarterly*, March, 1913.

[2] A somewhat detailed biographical sketch of Mr. McIntyre appears in the *Druggist's Circular* for February, 1913.—Editor.

It was Mr. McIntyre's discoveries of adulterated drugs in the New York market, and his energy in directing general attention to them, which led to the first federal legislation on this subject, to the official inspection of drug importations and, incidentally, to the formation of the American Pharmaceutical Association. Mr. McIntyre's interest in pharmaceutical education was early enlisted and grew steadily with his individual development. He watched its progress as a national institution, while he worked unremittingly for its local advancement. Perhaps the New York College of Pharmacy is his greatest monument, although that claim may well be contested by the American Pharmaceutical Association. He gave freely of both his time and money to protect and advance it at many stages of its career, and the conservation of its educational ideals is largely attributable to his steady support during various critical periods.

One of the most striking characteristics of this really great man was his ability to so easily take to himself each newly appearing generation, while retaining all of value that he had gained through his acquaintance with those who had preceded. His mind refused to bow to the psychological law of failure of the aged to perceive the new while clinging tenaciously to the memory of the past. He thus secured a place in the minds and hearts of the latest graduates in pharmacy that was hardly less secure than that which he retained with the aged. With all these persons he will continue to live in his death, and the influence of his character upon their lives must continue to be great.

Mr. McIntyre's religious life was one of steadiness and consistency. He lived his belief. Were there more to live as he did, there would be fewer to doubt the sufficiency of Christianity as the dominant power.

Personally, Mr. McIntyre was of the most sweet and cheerful disposition. Present trouble was with him always submerged in a confident and realizing faith in the future. His very entrance into the presence of discouragement or sadness tended to dissipate it. The sight of his smiling face and the grasp of his hand were a never-failing stimulus, and their memory is an abiding reality.

H. H. Rusby.

A TRIP TO EUROPE.[1]

During the last decade trips to Europe arranged by societies of all kinds have been undertaken with great success. Singing societies, veterans of the German army, teachers' associations, and various scientific societies have visited England, France, Germany and other parts of Europe and derived much pleasure and instruction from these trips.

These visits have been reciprocated by Europe, and a number of social and scientific societies from England and Germany have come to see our customs and institutions. No wonder, therefore, that American pharmacists should also think of such a journey, and the committee appointed by Dr. Ch. F. Klippert, the president of the German Apotheker-Verein of New York, and headed by Dr. W. C. Alpers is perfectly timely. Nor can there be any doubt that such an enterprise can best be undertaken by the Apotheker-Verein, whose members all speak two or more languages, and many of whom have visited Europe repeatedly and are therefore familiar with the travelling conditions of the various countries.

The idea of such a trip by pharmacists is not new. Some years ago, at the occasion of the world's fair at Paris, the American Pharmaceutical Association appointed a committee to submit plans, to visit the fair in a body and hold the meetings on the steamer during the trip across the ocean. But many members feared that in case of inclement weather these meetings might prove a failure and others did not like the idea that pleasure and entertainment should have a deciding influence on the selection of the place of meeting, and the project failed. A good financial plan was also lacking, and many feared the height of the expenses.

Profiting by the failure of that venture the present advocates of the plan hope to avoid these cliffs. In the first place, this is to be a general enterprise, open to every pharmacist and his friends, so that no constitution or by-laws of any existing society will be interfered with. As to the expense, it is true that but few of our fellow-pharmacists would be able to draw the full amount—at least $150 or $200 for each person—out of their business at one time, but with the aid of proper financiering this sum can be saved gradually. Suppose the trip will take place in two years, arrangements of regular monthly contributions can be made, which the contributor may withdraw at any time, if he will not join in the enterprise. Monthly payments of $5.00 would accumulate to more than half the required sum, and $10.00 monthly be more than sufficient to defray all expenses. Everybody knows that it is much easier to save $10.00 a month than to draw $200 at one time.

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[1] Translated from an editorial in the "Apotheker-Zeitung."

The trip itself would serve a double purpose; first, pleasure and recreation, and second, instruction and information, and each participant can follow his own inclination in this respect. The most beautiful parts of England, France and Germany—wherever the trip is planned—will be selected, and each one given full occasion to behold and admire whatever is worth seeing. Side-trips to points of interest to this one or that one will also be arranged. It may be supposed that the chemists, pharmaciens and Apotheker of the respective countries will contribute their share to the enterprise of the guests, so that the object of recreation will fully be reached.

At the same time, in planning the trip, due regard will be paid to information and instruction. Cities with world renowned chemical factories, like Elberfeld, Darmstadt, Hoechst, Leipzig, and others will be visited, in order to give the travellers an insight into the magnitude of the European chemical industry. Also universities and schools of technology that possess chairs of learning or laboratories of particular interest to pharmacists will not be omitted and these visits will be of particular interest to our teachers and professors.

At the return each traveller will have the privilege of staying longer with friends and relatives in Europe or to extend the trip to other countries. We believe that among the 45,000 pharmacists of the United States a sufficient number can be found, whose "Wanderlust" will make them join such an enterprise and we wish the appointed committee the best success.

NEW SOURCES OF TURPENTINE

Turpentine from western yellow pine, says the Department of Agriculture, can be put to the same uses as that from the longleaf pine of the southeast, which furnishes the bulk of the turpentine of commerce. Western yellow pine forms enormous forests in the

Rocky Mountain and Pacific Coast States, while the supply of longleaf is fast melting away. A product very similar to turpentine can be obtained also from pinon pine, another tree common in the southwest.

Careful tests made by the Department have shown that the yield of turpentine and rosin per season from western yellow pine in Arizona is only two-thirds that from the southeastern pine, the difference being due to the fact that the season of flow in the west is about 25 weeks, and in the south about 33 weeks. During the Civil War, when turpentining operations in the south had virtually ceased, some operations were carried on in California to meet local needs. But with the return of the southern product to the California market, the western operations were abandoned.

The results of a chemical examination of the oils of western yellow, pinon, digger, sugar, and lodgepole pines which have just been published by the Forest Service in an official bulletin show the possibilities of the rosin and turpentine from western yellow and pinon pines as a supplement to the present supplies. Economic problems of markets, transportation, and labor remain to be solved. Information as to how the Forest Service secured the yields upon which the analyses were based is given in another bulletin on the possibilities of western pines as a source of naval stores.

UTILIZATION OF ATMOSPHERIC NITROGEN.

A bulletin, giving the results of investigations of chemical industries made by Consul Thomas H. Norton, of Chemnitz, Germany, detailed as commercial agent of the Department of Commerce and Labor, has been issued recently by the Bureau of Foreign and Domestic Commerce. It is entitled, "Utilization of Atmospheric Nitrogen," and deals with the efforts that are being made to release the manufacturing and agricultural interests of the world from dependence upon natural sources of nitrates, particularly the saltpeter deposits of Chile. The most decided progress is being made by chemists in Germany, Scandinavia, France, Switzerland, and Austria, and the bulletin furnishes as accurate and comprehensive data as possible of the results thus far obtained by European chemists in their efforts to increase the supply of nitrogen.

Copies of this bulletin (Special Agents Series No. 52) may be obtained upon application to the Bureau of Foreign and Domestic Commerce, at Washington.

THE AMERICAN
JOURNAL OF PHARMACY

APRIL, 1913

THE ASSAY OF HYPOPHOSPHOROUS ACID.

By Horace North,
Analyst with Lehn & Fink, New York.

It is proposed to neutralize hypophosphorous acid with barium hydroxide, collect any precipitate that forms on a filter and weigh after ignition. The weight in milligrams per gram of absolute acid is termed the barium number. By this means, samples containing excessive amounts of foreign acids (sulphuric, oxalic, tartaric, phosphoric, phosphorous) are readily detected. In the writer's opinion, an acid fit for use in medicinal preparations should have a barium number not greater than 5. Analyses of six commercial lots are given in the table. The details of the method are as follows:

Analyses of Commercial Hypophosphorous Acid.

Sample	Acidity as hypophosphorous acid	Barium number
No. 3548	29.73 per cent.	5.1
No. 3592	31.33 per cent.	6.9
No. 3636	31.42 per cent.	36.6
No. 3979	31.33 per cent.	12.3
No. 4400	31.20 per cent.	3.4
No. 4634	31.19 per cent.	4.4

Put 1 c.c. of hypophosphorous acid in a tared, stoppered Erlenmeyer flask and weigh accurately. Add 20 c.c. of water recently boiled to expel CO_2 and cooled and a few drops of phenolphthalein solution. Titrate the liquid with $^N/_5$ $Ba(OH)_2$ (standardized against $^N/_5$ HCl) until a permanent pink color is produced. Put the flask in a water-oven for an hour, then collect any precipitate that may have formed on a 7 cm. Swedish filter, washing with hot water until the filtrate no longer yields any turbidity on the addition of a few drops of dilute sulphuric acid, and burn the filter in a platinum crucible. Deduct the ash of the filter from the weight of the residue. The corrected weight in milligrams divided by the weight in grams of absolute acid indicated by the titration is the barium number.

CULTIVATION OF HYDRASTIS.

By John O. Baldwin.

Hydrastis Canadensis L., Golden Seal, Fam. *Ranunculaceae,* is one of the most useful and valuable plants of our American forests, and so fast is the supply diminishing, that a few men have undertaken its cultivation, what success this enterprise may develop is for time to determine.

I shall in this article try to note some of the essential requirements necessary to the growth and development of this plant, referring to its history only casually.

A few years ago, as an experiment, I removed a few wild plants of golden seal from their native heath to a portion of my ginseng garden which at the time was vacant; the behavior of the plant in this experiment was eminently encouraging, and I accordingly proceeded to gather all of the wild roots and seed which I could find,—result—I now have a fine stock of growing plants under cultivation, but none for sale at this writing, as I expect to further enlarge my beds with whatever stock I may find which will do to remove this season.

The natural home of the golden seal is in the deep shady nooks of our American forests, where the soil is rich and soft and deep, and the moisture and the drainage are in its favor,—where once it grew in profusion, it is found only in patches now, and these small areas are constantly giving away to only here and there a single plant, and these lingering halos of a past wild woodland glory are, year by year, teaching their lessons of conservation to the student and grower.

To be successful in the growing of this plant, the natural conditions must be carefully and strictly observed, artificial means being employed only where they improve upon the natural, where the plants originally grew, and then, the natural conditions should not be eliminated or overlooked.

SOIL—BEDS—DRAINAGE.

The soil of my beds is a gravelly sandy loam mixed with clay; it is generally speaking, good corn ground, sloping to the north; being located upon a bank of Tinker's Creek (in northern Ohio), but above the flood line, they have an excellent natural drainage, which is necessary in the growing of this plant.

I work the soil thoroughly and deeply, in the fall, throwing out all roots, stone and coarse material, spading in well-rotted barnyard compost, vegetable leaf mould, or rotten sawdust; hence, let the beds remain until spring, again giving them the same liberal treatment, a couple of weeks before setting, giving them time to settle a little before planting out. I would here state that the soil can not be made too fertile for golden seal, neither be too soft for a good growth; it is a hardy feeder and depletes soil rapidly, but when it is well fostered and nourished it basks in its surroundings and is an easy plant to grow; therefore, imitation of the soil like unto the plant's forest home should be given strict observance when making the beds for a plant whose every nature is wild, and whom man is trying to domesticate.

Make the beds four feet wide for convenience in working, wider ones are harder to work when weeding, seeding, etc. The length of the beds is immaterial; they should be spaded and respaded, before plants are set, should be thoroughly worked over and enriched again and again, this treatment insures a good and sturdy growth. Be sure of the drainage, for the plant will not grow where the ground is wet, if there is no good natural drainage, provide for the same, and here the artificial comes in; lay a row of two- or three-inch tile lengthwise through the bed with plenty of fall and provide a good outlet and be sure this is open at all times; this drain should be about sixteen inches below the surface of the bed—in the plants' forests home the drainage was largely upward, but here under culture it must be downward, the trees and herbage of the woods absorbed large quantities of water, but under artificial shade the drainage of surplus water must be gotten rid of rapidly.

ENRICHMENT.

I have never used any kind of commercial fertilizer upon my garden—only decayed barnyard compost, rotten sawdust, and vegetable leaf mould. Therefore I can not speak intelligently regarding the use of commercial fertilizers in this new industry, only as I have observed their workings upon gardens other than my own. I have been successful in growing both golden seal and ginseng, and have never had, so far as I know, any disease infest my garden, or failure in any way so far as disease is concerned, having employed the above enrichments exclusively, because they are to my mind, more natural to the growth of the plant. Here, let me give the prospective grower a word of caution; some growers advise the use of hen manure, lime, wood ashes, etc., etc., etc., but I do not; the writer experimented with these during the past season, upon a small bed, and one experiment will be sufficient, for if there are any of the beautiful plants left after such a holocaust, it will be a miracle. The nearer to nature the plants can be produced, the more satisfactory will be the results to the grower; remember that these are wild plants and they are not to be domesticated in a day or in a season; their nature is wild and their growth is slow, and any thing which tends to thwart or interfere with nature,—in other words, forcing or "hustling" them, to "get the money,"—usually works disaster both to plants and grower.

PLANTS AND SETTING.

I aim to set all plants that I possibly can in the spring, so soon as I can find them; the month of May is the banner month with me, for this work, although I have set plants from early spring to late fall with fairly good results; the month of May I find by experience the best, as above stated, for it is then that the soil works best, there is just the right amount of moisture in the soil, and the weather is also right for the plants to grow and to keep on growing the whole season through, very few of them wilting after being set, and what few do, most always recover in a short time and grow.

I grade my plants into large, medium and small, or into grades of three, two and one years; proceeding to set the largest and best ones first, and so on down, by so doing I save all pieces which become broken in handling, which are also valuable, these are set with the small and one year roots and often grow into good plants later. Golden seal roots may be broken up and planted the same as the potato is cut and planted, only, if a piece is minus an eye, an eye will almost invariably form and produce a plant. I have found plants growing from the thread-like rootlets left in the ground where a bed had been dug out a season or two previous, thus proving its sturdy persistent growth. Starting golden seal from seed is a very wearisome task, requiring some skill and considerable patience, for the seed are very slow to germinate, yet after they are once out of the ground, and after the first season they do very well with a little extra care the second year, gaining their growth rather rapidly; remove from the nursery bed, to the permanent bed when in the second season of their existence; I might add, never try to stratify Hydrastis seed, have a bed ready and sow them immediately after picking, covering them lightly. In setting plants take a board four feet long and eight inches wide, and lay across the bed to stand upon, so as not to tramp the bed; the edges of this board should be straight; with a garden trowel make a trench in depth necessary to the size of roots to be set, along one edge of the board, set in the plants, packing the soil firmly around them, remove the board the width of its self and repeat the operation, this leaves the rows about eight inches apart, setting them six inches in the row; leave the surface of the bed level, after which, give all a light mulch of well rotted horse manure, sawdust or forest leaves, to help hold the moisture during the long hot summer days.

Artificial Shade Best.

The common slat shed, the same as used in ginseng culture, is the best for the growing of golden seal, as the plants grow better under this, than they do under trees and vines, as they have the advantage of the fertility and moisture, which trees and vines would rob them of during the growing period, the plants should have every advantage conducive to their growth at this time, because this period of their life is short; this reason alone should be in favor of the artificial shade, though other reasons might be given.

Mulching.

Late in autumn, before the ground freezes, I cover the beds with forest leaves to the depth of two or three inches; it has been my experience that a too deep covering does more harm than good, because of field mice burrowing through the beds; when digging roots last fall (and I had noticed it before), I found quite a number of roots, especially ginseng, badly gnawed by these pests, some of the roots were nearly eaten entire, I began an investigation, thinking that perhaps grubs were the destroyers and yet the roots showed teeth markings which grubs did not or could not do, at last I found a small run-way below the surface, and I followed this, at the end of it I found a nest of field mice huddled away as comfortable as you please, with pieces of ginseng root handy for the next meal—they were the guilty parties,—no golden seal root was found in this nest; therefore I think a light mulch to keep the frost from heaving the roots out of the ground, and just covering enough to protect them from the weather, gives to me the best satisfaction.

MISCELLANEOUS.

I do not wish nor is it my intention to antagonize anyone engaged in this industry; I have only spoken here a few words based upon my own experience; and I stand ready to adopt any improvement which gives results better than those which I already employ; I do not say that my ways or ideas are the best, but I do claim that the things which I have worked out myself, from year to year, are the most practical and are of the most value to me.

There is a tendency of a number to go into the growing of Hydrastis, let me say to them, like unto the army who a few years ago undertook ginseng culture and failed, that there is something to learn in this business before success is attained, unless vital things are steadfastly followed in the growing of Hydrastis, ruin will be the result, some writers seem to create the idea, or have a tendency to leave the impression that the cultivation of not only Hydrastis, but of other drug plants, is merely a haphazard, "happy go lucky" kind of a game, where one may with little effort scatter a few seeds upon earth's floor, and later reap a bountiful harvest, but I say unto all concerned, if treasures are to be reaped from the golden gathering, long earnest and persistent effort will be required before the reward of merit is obtained; to be sure a crop of golden seal can be grown in about one half the time it takes to produce a crop of ginseng, yet the grower has to know how to grow it to be successful.

Regarding quantity, a goodly number of acres will be required before the supply will overstock the market; the time will never be again, I dare say, when the cultivated root will be in quantity what the wild produced. There will always be, I predict, a sale and at a good price for all that the grower can grow, but he must labor well and long, and in patience must he wait for it.

TWINSBURG, OHIO, February, 1913.

TINCTURE OF IODINE.*

By L. F. KEBLER,

Chief Drug Division, Bureau of Chemistry, U. S. Department of Agriculture.

This commodity has probably been examined more frequently than any other simple drug offered for sale by the retail trade and I know of no medicinal agent which has more frequently been found wanting. Observations and investigations have frequently shown that when iodine was dissolved in simple ethyl alcohol there was a great tendency for the iodine to be changed into hydriodic acid and other compounds thus actually lowering the free iodine content and the diminution increased with the age of the preparation. Experiments conducted to obviate this difficulty indicated that the presence of potassium iodide tended to inhibit the usual combination of the iodine and thus increase the stability of the tincture. The method outlined for the manufacture of this commodity by the last (8th) revision of the U. S. Pharmacopœia prescribes the use of a certain amount of potassium iodide. The shortcomings of the tinctures available on the market have, however, not been materially reduced. Almost every State Board which has taken up this question has found that a large number of the samples are deficient in iodine content. This shortcoming cannot now be so fully ascribed to deterioration, neither can it be ascribed to difficulties in manufacture because the process of manufacture is extremely simple.

During the past few years a considerable number of samples of tincture of iodine have been examined in the Bureau of Chemistry. The samples shipped into interstate commerce were found to comply closely with the Pharmacopœial requirements. All of them contain the requisite amount of potassium iodide. A goodly number of samples were collected in the District of Columbia and analyzed with the following results:

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* Read before the City of Washington Branch American Pharmaceutical Association, February 12, 1913, and contributed by the author.

ANALYSIS OF TINCTURE OF IODINE, RESULTS.

Iodine.		Potassium Iodide.		Alcohol.	
Grams per 100 c.c.	Per cent. Variation[1].	Grams per 100 c.c.	Per cent. Variation[1].	Per cent. Volume.	Declaration.
1.97	71.5	1.3	74	86	Correct.
3.42	50	None	100	93.5	Not declared.
4.40	36	5.38	7.5	85	Not declared.
5.04	27	None	100	94.4	Not declared.
5.08	26	3.03	40	95	Small type.
5.09	26	Trace	100	91	Correct.
5.36	22	2.1	58	95	Correct.
5.52	19.5	5.30	6	95	Not declared.
5.57	19.5	5.84	17	93.5	Not declared.
5.81	15	5.03	None	93.5	Correct.
5.88	14.5	None	100	95	Not declared.
5.89	14.5	None	100	92.8	Not declared.
6.06	12.5	6.82	36	94.5	Correct.
6.09	11	1.02	80	93.5	Not declared.
6.11	10	4.93	1	95	Correct.
6.18	10	5.37	7	91	Correct.
6.18	10	4.45	11	93	Correct.
6.24	9	4.32	13.5	88	Correct.
6.29	8	2.79	46	91	Not declared.
6.29	8	4.61	8	91	Small type.
6.32	8	2.58	48.5	91	Not declared.
6.34	7.5	None	100	93.6	Small type.
6.36	7.5	3.84	23	93.5	Not declared.
6.48	5.5	4.92	2	95	Correct.
6.48	5.5	3.81	24	88.5	Correct.
6.49	5.5	5.34	7	95	Small type.
6.73	.5	6.52	30	95	Correct.
6.75	.5	2.42	51.5	96	Correct.
6.76	.5	3.82	24	85.50	Small type.
6.78	....	2.46	51	90.5	Correct.
6.80	....	3.95	21	91	Not declared.
6.80	....	3.49	30	86.5–	Not declared.
6.84	....	5.56	11	93	Incorrect.
6.85	....	5.1	2	92.72	Correct.
6.90	....	0.97	80.5	95	Small type.
6.97	.5	None	100	91.5	Small type.
7.00	2.0	5.79	16	91	Not declared.
7.03	2.5	5.52	10	91	Small type.
7.04	2.5	5.00	None	93.5	Correct.
7.18	4.5	4.58	8.5	89.5	Correct.
7.21	4.5	5.17	3	90.5	Correct.
7.21	4.5	5.67	13.5	88.50	Not declared.
7.24	5.5	5.14	3	90	Not declared.
7.58	10.5	5.12	2	94.5	Correct.
7.95	15.6	4.50	10	86	Not declared.
8.07	17.5	4.38	12.5	90	Small type.
8.11	18	3.86	23	91.50	Not declared.
8.11	18	6.00	20	95	Correct.
8.37	21.9	5.45	9	89	Not declared.
9.26	35	5.23	4.5	89.5	Not declared.

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[1] N. B. The per cent. variation in above analyses is calculated to the nearest half per cent.

The pharmacopœial tincture contains "about" 6.86 grams of free iodine and 5 grams of potassium iodide in 100 c.c. The range of variation (1.97 to 9.26 grams per 100 c.c.) is certainly remarkable. What real valid excuse can be offered for either of the above extremes? Furthermore, is there any substantial reason for some of the other variations? The permissible variation from the standard must be met sooner or later. Shall it be stringent or reasonable? If reasonable shall the variation be 5 per cent. or 10 per cent. or 20 per cent.? Considering that the adjective "about" qualifies the amount of free iodine that should be present in the tincture, about 60 per cent. exceed a 5 per cent. variation, 40 per cent. a 10 per cent. variation and 18 per cent. a 20 per cent. variation. I do not believe many manufacturers will contend for or advise a 20 per cent. variation in that it would not only savor of carelessness but actually encourage it. Is then a 10 per cent. variation either way from the standard, reasonable, fair and just to the manufacturer, the consumer, the physician, etc., or is it desirable to be more stringent?

Suggestions are invited either in the columns of this journal or otherwise. The free iodine is the essential factor of this tincture but the potassium iodide and percentage of alcohol must also be considered. The conditions noted above relative to the variability of the free iodine also holds for potassium iodide. The variation ranges from no potassium iodide to 6.82 grams per 100 c.c. Discussion in this connection is also invited.

THE CHANGE FROM THE OLD TO THE NEW BOTANY IN THE UNITED STATES.[1]

By W. G. Farlow.

It is generally known that in the seventies there was a sudden development of the study of botany in this country. Just how and why this sudden development took place at that particular date is, I suspect, not clearly recognized, at least by our younger men. From histories and reports of progress they can learn the main facts, but those who, as students or instructors, have lived through the transitional period when the old botany was changed into the new are in a better position to appreciate the underlying causes. There are, however, few such persons still living and the small number is not wholly due to the normal death rate. The relative number of botanists was smaller then than now and it will not do to assume that this was owing solely to the lack of attractions in the botany of the day. The main reason was that one could hardly expect to earn a living as a botanist. When I graduated from college in 1866 and wished to become a botanist, Professor Gray told me that I ought to study medicine first because the possibility of gaining a living by botany was so small that one should always have a regular profession to fall back upon. In fact, at that time medicine was practically the gate through which it was necessary to pass in order to enter the field of botany. Some years later De Bary told me that, when he was a young man, there was a similar state of things in Germany and, although desiring to devote himself to botany, he had to study medicine, taking his degree in 1853. In 1872, however, things had changed in Europe and when I went to Strassburg to study I was the only student in De Bary's laboratory who had studied medicine. The others had begun the special study of botany on entering the university and were, although no older than I was, much better trained in botany.

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[1] Address of retiring president of the Botanical Society of America, given at the Botanists' Dinner, Cleveland, January 1, 1913.

In 1866, there were very few botanical professorships in this country, the salaries were very small and the equipment very shabby. Gray was professor at Harvard, D. C. Eaton at Yale and Porter at Lafayette. Torrey, in spite of his distinction as a botanist, really depended on his position as a chemist for his living. The comparatively few positions in government and state stations offered few attractions and changes were frequent. To a young man the prospect was not assuring.

If we look further and ask what was the attitude of the public towards natural science, we find a state of things very difficult to appreciate at the present time. This can be illustrated by my own experience as a school boy. When I was in the high school one of the books we had to study in the upper classes was Paley's "Natural Theology." You may perhaps infer from this that the object was to give us religious instruction. Not at all. The real object was to smuggle a little human anatomy into the schools. This was the way it was done. Very few of you probably ever heard of Paley's "Natural Theology," in its way a remarkable book. In the opening chapter Paley supposes that a man walking in the fields finds a watch on the ground. He sees the complicated machinery adapted to a definite purpose and therefore, according to Paley, at once infers that it must have had an intelligent creator. How much more strongly, therefore, should a contemplation of the organs of the human body, well adapted to perform special functions, lead us to believe in the existence of an intelligent creator. Paley then proceeds to give a rather mild account of human anatomy illustrated by plates intended to impress the readers; a ghastly head with the cheek dissected to show the parotid gland; and abdomen with the lid removed to show the bonbons inside, the stomach and spleen ingeniously arranged so as to show also the deeper lying organs, etc. Paley's reasoning does not now seem altogether convincing. If you or I had found the watch, we should have seen that it was complicated and we should have known that its purpose was to show the time of day. We should have known also that it had been made by a watchmaker. If, however, a savage who had never seen or heard of a watch had found one in the field, he would have been mystified by the mechanism and would not have had the least idea what its purpose was. Instead of recognizing an intelligent creator he would have regarded the watch itself as a god.

Now, at the time of which I am speaking, it would not have been proper to teach anatomy *as such* in the schools, but anatomy, so far as it served to show the goodness and intelligence of the creator, was quite legitimate. In other words in studying natural history one must never forget that God had made man to be the centre of the universe and all other things had been arranged for the benefit of man, and, when facts to the contrary appeared, they must be properly interpreted or denied. Since an omniscient and omnipotent being can not make a mistake, all the species of plants created in the beginning must forever remain as they were created. With this simple theory of living things people were perfectly contented until in 1859 the "Origin of Species" fell like a bomb in the camp and shattered time-worn theories. That the variations and adaptations of plants and animals were not for the benefit of man, but for the benefit of the plants and animals themselves, was a dreadful heresy. The violence of the controversy caused by Darwin's great work was something of which the present generation can have no conception. It was at its height when I was a college student. Young men were generally inclined to accept

Darwin's views, and in our college natural history society most of the meetings were spent in discussing evolution. Some of us had really read the "Origin of Species," but all were ready to talk about it. The older men, even the naturalists by profession, were much more conservative. A few adventurous spirits were more Darwinian than Darwin himself, but college professors had to be careful in what they said, for practically the whole religious world and the greater part of college graduates were not ready then to accept evolution. The bitter feeling of the anti-Darwinians continued for a considerable number of years, as is shown by the following instance. A little more than twelve years after the appearance of the "Origin of Species" one of our leading universities wished to appoint a professor of zoology. The place was offered to a friend of mine with the stipulation that he should never, directly or indirectly, refer to evolution in his lectures. As my friend was one of the most rabid evolutionists in America, the conditional offer seemed amusing. He, of course, declined and the place was then offered to one hardly less radical in his views, and was again declined. It was rumored that the place was offered to a third person and again declined, but I have no direct knowledge that this was the case. The present incumbent, I presume, believes in evolution, but probably no one has ever taken the trouble to ask him whether he does or not for, at the present day we should no more think of asking a professor of zoology whether he believes in evolution than whether he is the fortunate owner of a tooth-brush.

At a time when many of the leading zoologists, including Louis Agassiz, were strongly opposed to Darwin's views, the botanist, Asa Gray, exerted a powerful influence in converting the public to the doctrine of evolution. His simple and attractive style enabled him to reach an audience which would have been repelled by the dryness generally supposed to be characteristic of scientific writings. He was also known to be a member of the orthodox church and the good religious people of the country said: "If the orthodox Gray sees in evolution nothing inconsistent with revelation, why may we not also accept it?" Furthermore, Gray did not go too far in his views, whereas some of the evolutionists started off on a wild sea of speculation whither the public would not be expected to follow.

Having tried as far as the limited time allows to give you an idea of the attitude of the public towards natural science, at the time when I began the study of botany, a word may be said about the botanical instruction in colleges. At Harvard botany was a required study for the whole class during half of the sophomore year. The text-bok was Gray's "Structural Botany." Gray had no assistant. To require botany of a whole college class—I am not speaking of agricultural schools—is enough to condemn it to neglect and abuse. This, however, can be said of college students. If their instructors do not interest them they are always able to amuse themselves. In the corner of our lecture room was the trunk of a palmetto which had been used to grace the funeral procession of Calhoun and afterwards given by Professor Gibbs to Gray as of historical as well as botanical interest. It was the duty of the athletes while the attention of the instructor was diverted to seize the trunk and carry it to the entry and later on to start it rolling down the very winding staircase. This method of studying botany I discovered later was not confined to Harvard. Once while visiting a western university I noticed, to my surprise, a cannon ball back of a door. I asked why it was there and was told, not by a student, but by the instructor himself, that during the lectures the students rolled it along to the head of the staircase when gravity was left to do its perfect work. Afterwards some attention was paid to the lecturer, and how much was learned on any one day depends on how early in the hour the cannon ball was started on its way. Compulsory botany was not a success. In my junior year eight or ten students who really wished to study botany asked Gray to give them some instruction in systematic botany during the season when fresh material could be obtained. The work on our part was entirely voluntary and in addition to our regular work. It was not recognized by the college and we received no credit for it in the rank list. The number of voluntary workers was reduced to two in my senior year, when we had so much regular work as to leave almost no spare time. I have noticed in recent years a growing disposition to demand some reward in the shape of a degree or a certificate of some kind for any work done outside the regular curriculum. To do work for the pleasure of adding to one's knowledge is, I regret to say, getting to be a sign that one is not up to date.

On graduating I followed Gray's advice and entered the medical school, hoping sooner or later to be able to return to botany. The opportunity came in 1870 when Gray returned from Europe. During his absence Horace Mann, Jr., who had been taking his place, died and I was then appointed assistant. I was always interested in cryptogams and, had it been possible for me to do as I pleased, I should never have studied anything but marine algæ during the rest of my life. It became my duty to arrange the thallophytes of the Gray Herbarium and the work I did was radical, I assure you. Not knowing that Littleton Island was near the North Pole, but supposing it to be somewhere in Long Island, I arranged into the waste-paper basket a number of rather shabby-looking algæ which I afterwards discovered to my mortification were very rare. It did not take long for me to find out that, whatever professors of pedagogy may say, one can not teach a subject without knowing something about it. But where was I to go to study cryptogams? It was proposed that I should study fungi with M. A. Curtis, but he died in 1872. For marine algæ I had to depend on Harvey's "Nereis" and J. G. Agardh's "Species," works which were not easily followed by a beginner, with occasional reference to the by no means exhilarating "Micrographic Dictionary."

Evidently, I must go to Europe, and Germany was the country whose universities offered the greatest facilities for my purpose. The most promising were those of Strassburg, where De Bary was professor, and Wuerzburg, where was Sachs. I chose the former rather at a venture. The other botanists there were Solms and Fr. Schmitz, then a very young man whose work had been in histology. The venerable W. P. Schimper, the bryologist and paleontologist, whose valuable herbarium had been given to the university before the Franco-German war, remained in charge of it and gave a course of lectures. My fellow students were Stahl, Rostafinski, Gilkinet, Suppanetz, an Austrian, Kemienski, who recently died at Odessa, Karl Lindstedt and Doelbruck, who died young. I learned that I was not the first American who had studied with De Bary. A short time before, while he was professor at Halle, an American, T. D. Biscoe, had taken a course in botany, although not studying botany as a specialty. The only information I have in regard to Mr. Biscoe is that he published a paper on the winter state of our duckweeds in the *American Naturalist* of 1873. There was only one other American, a law student, at Strassburg when I arrived there, for, to the surprise of my fellow-botanists I was not willing to acknowledge as a fellowcountryman a Chilian, whose principal occupation seemed to be duelling and whose English vocabulary was limited to the two words, "damn Yankee."

The general arrangements at Strassburg were the same then as those of other German universities at the present time, but the method of working in the laboratory was very different. I was given a *Chara* to study and in a couple of hours reported that I had studied it. I was told that I had not even begun. Studying, it seems, meant that I must make sections through the scheitel and trace the successive cell-formations. But how was I to make a section and what was a scheitel? The microtome and modern methods of imbedding were then unknown to botanists and all sections had to be made by hand. The nearest approach to imbedding was in sectioning small objects like pollen grains; a few drops of mucilage were placed on a cork, the pollen mixed with it and the whole allowed to harden. Then by holding the cork in one hand one could make sections of the pollen if one were lucky. The student of the present day, when hand-sectioning seems almost a lost art, does not realize what skill in sectioning could be acquired by practice, but, like playing on a musical instrument, constant practise was needed to keep one's hand in. Modern technique, which was borrowed by botanists from the zoologists, has of course many advantages, especially in cytological work, but, for certain work, hand-sectioning has its advantages, as, for instance, the rapidity with which sections can be made.

If I was fortunate in my fellow students at Strassburg, in one respect I was less fortunate. At the time De Bary himself was at work on his "Vergleichende Anatomie," which was published in 1877. Anatomical studies were not his strong point, but, in an unguarded moment, he had promised Hofmeister that he would write the volume for his series and he felt in duty bound to keep his promise. We should have preferred to have had him working on the mycological subjects in which he excelled, but the management of cell cultures and the technique required in such investigations were taught to his pupils. Rostafinski took his doctor's degree while I was in Strassburg, with the thesis, "Versuch eines Systems der Mycetozoen." The monograph of that group did not appear until 1875. I happened to hear De Bary and Schimper talking about Rostafinski's thesis, which they thought was a good work, although they regretted that he had made so many genera. What would they say were they now living, when it almost seems as if we were trying to create a new genus for every species?

In the laboratory I noticed that the students seemed to refer frequently to a book of which I had never seen a copy or even heard. The book was Sachs's "Lehrbuch," second edition, 1870. I bought the book and was perfectly amazed. I had never dreamed that botany covered so large a field. The "Lehrbuch" was an admirable summary of what was known of all departments of botany up to that date, well written and excellently illustrated. The fourth edition, which appeared while I was in Strassburg, was still better. On looking at the second edition a number of years later, I noticed what seemed to be a curious omission. No mention whatever was made of bacteria. In the fourth edition they are mentioned under *Schizomycetes*. The absence of reference to bacteria in the earlier edition, however, was not an omission. There were no bacteria at that date. There were no bacteria until Cohn published his "Untersuchungen über Bacterien" in 1872. The fact that forty years ago Sachs had never heard of bacteria, while to-day life has almost become a burden, one hears so much about them, is a striking instance of the rapidity of development of a subject having a practical as well as a theoretical value. I know no single book which has had so great an influence in shaping the course of modern botany as Sachs's "Lehrbuch." It may be that the facts there given were generally known in Germany, but they were not known in other countries. On returning home by way of England in 1874, I showed my copy of Sachs to several English Botanists and it was evident that it was quite new to them. It was certainly unknown in America. If imitation is the sincerest flattery, the value of Sachs's "Lehrbuch" was quickly recognized, for, using it as a model or basis, there soon appeared a large number of really excellent text-books in various languages in which one recognized Sachs translated, Sachs condensed, Sachs diluted, Sachs trimmed to suit local demands. Publishers, were they capable of gratitude, would have erected a monument to Sachs's memory long ago. Draughtsmen, on the other hand, had little reason to bless his memory. Even now we can hardly open a new text-book without seeing the inevitable "after Sachs."

One evening I was present at a dinner given by De Bary. On that gay and festive occasion I heard more gossip about botanists than one hears even at a meeting of the Botanical Society of

America. My neighbors kept saying: "der schmutzige Kerl." On asking who the dirty fellow was, they said Naegeli. In my innocence I inquired what Naegeli they meant. They answered "*Der* Naegeli." Even starch could not save his reputation, and they proceeded to tell not one but many tales which I know you are dying to hear but which I am not going to tell you. What I wish to say is this: At the same dinner some one, possibly Rostafinski, spoke of a certain Strasburger, a botanist. I understood him to refer to some botanist living in Strassburg and asked his name. I was told that he was a Pole named Strasburger who lived not in Strassburg but in Jena and had written a work which showed him to be a promising young man. That was the first time that I had heard of Strasburger, who had not then begun his work in cytology. The promise was fulfilled and the young man of 1873 became one of the bright lights of the botanical world. At the close of his long but too brief career he left a brilliant school in a department of botany which he had created and of which he remained until his death the leading spirit. Fortunately we have with us a younger generation admirably qualified to continue the work which he began.

For the last twenty years most young American botanists have thought it necessary to study in Germany to complete their education, but, when I returned in 1874, I was looked upon very much as one would be who had returned from a journey in Thibet or Central Africa. Things had changed. The country had recovered from the effects of the Civil War, money was more abundant and more could be spent on science. New professors were appointed in the colleges and courses for the instruction of school teachers in botany and zoology were provided by private individuals. I have time only to refer to one curious episode in the development of botany in America. I refer to what may be called the biological epidemic which broke out soon after I returned to America and threatened for a time to drive botany from the field. If at some future time some one ventures to write a book on the abuse of the "ologies" the chapter on biology will be the most interesting. As far as I can make out, as originally used, biology did not differ much from physiology. The laboratory manual of Huxley and Martin was planned to correct the common idea that botany and zoology consisted in the description of different species of plants and animals, whereas in reality they are the study of plants and animals in all their relations to one another and to their surroundings. Huxley and Martin's book was extensively used in this country and was in many ways excellent. The criticism might be made that it was not well proportioned. Without saying that it was all lobster, there was so much lobster and so little of plants that there was not enough to make a good lobster salad. Soon it became the habit of young persons who knew precious little about either plants or animals to call themselves biologists, disdaining to be called botanists or zoologists. It does not follow, however, that because one is neither a botanist nor a zoologist one is to be considered a biologist. Trustees of colleges and similar institutions were given to understand that a superior race of beings had arisen, the biologists, and that botanists and zoologists had had their day. Colleges being always impecunious, this information was gladly received by their governing boards. By calling their zoologists biologists they could escape appointing professors of botany. This clever device for saving a salary worked very well for a few years, but at last it became evident that the teaching by a zoologist with the aid of a text-book, how to distinguish a yeast cell from a fern prothallus and a fern prothallus from a germinating bean, was not all that was wanted in our colleges, although it might have been sufficient in a kindergarten. The epidemic of biology, although it hindered for a time the development of botany in England and America, fortunately never spread to other countries.

Although garrulity is the privilege of old age, I feel that I am still too young to take up more of your time this evening. This occasion, in which the body as well as the soul naturally participates, seemed to me to call not so much for a formal historical account of botany in my day as for a series of personal reminiscences, more or less anecdotical in form, which would throw a little light gained from the experience of one who, although he has lived long, hopes that he has not outlived sympathy with the present, on some of the steps by which our present advanced position among the botanists of the world has been reached. It has been my fortune to see the old order of things overturned by the appearance of the "Origin of Species" which, by freeing science from the fetters of a semitheological bias, opened the way to a free scientific study of the distribution of plants and animals and the great questions of heredity and evolution. To most of you this great change is only a historical fact. To me it is a living memory. I, who was almost the first American student to seek the benefit of botanical instruction abroad, have lived to see the time when a very large number of our botanists have brought back to America the best that Europe had to offer. There was a time when our botany might have been said to bear the mark "made in England." In more recent years it may be said to have been "made in Germany." There are some patriotic souls who hope that the time will come, if it has not already come, when we may say "made in America." I do not share their feeling. To me it seems that botany is destined to become more and more widely diffused until it becomes worldwide and it will be enough if we contribute our proper share to the general stock. I have lived to see the growth of several branches of botany which practically were not studied at all when I was young. Bacteriology and cytology are of recent origin. Plant physiology has been with us a child of slow growth, but it frequently has been the case that the strongest men have been slow in their development. Plant pathology from a crude and semi-popular beginning has become an exact science in whose study and practical application we have already surpassed other nations. When this society meets forty years hence, I shall not be present. Few of you will be present. But whatever of progress the speaker on that occasion may be able to report will be the result of a gradual development. It can hardly be expected that he will have to record any such radical and complete transformation as it has been my privilege to present to you this evening.

Harvard University.

THE CONSTITUENTS OF TARAXACUM ROOT.[1]

By Frederick Belding Power and Henry Browning, Jr.

The root of the common dandelion (*Taraxacum officinale*, Wiggers) appears to have been employed medicinally for several centuries, and it still maintains a place in the more important national Pharmacopœias. It is therefore somewhat remarkable that up to the present time so little of a definite nature should be known respecting its constituents, for, apart from the observed presence of inulin—which is common to the family of *Compositæ*—lævulin, and such ordinary constituents of plants as sugar, resin, and mucilage, no well-characterised compound has hitherto been isolated from this root.

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[1] From *Trans. Chem. Soc.* 1912 (vol. 101) pp. 2411-2429.

Polex (*Arch. Pharm.*, 1839, **19**, 50) has stated that on boiling the milky juice of taraxacum with water, filtering and concentrating the liquid, a crystalline substance was obtained which was sparingly soluble in cold water but readily so in boiling water, alcohol, or ether, and possessed an agreeably bitter, somewhat acrid taste. This substance was termed "taraxacin," but no analysis, melting point, or other characters were recorded which would serve for its identification. It was also noted by Polex (*loc. cit.*) that the resinous and albuminous material which separated on heating the milky juice to boiling, when extracted with alcohol, yielded a substance which crystallised in a white, cauliflower-like form.

Kromayer (*Arch. Pharm.*, 1861, **105**, 6) examined the dried milky juice of the plant, for which he proposed the name "leontodonium." From the portion of this which was soluble in water he obtained some crystals mixed with amorphous material, but did not succeed in isolating the so-called "taraxacin." The portion of the dried milky juice which was insoluble in water yielded, on extraction with alcohol, "tasteless, spherical granules," which the author designated as "taraxacerin." An analysis ($C=79.44$; $H=12.69$ per cent.) was recorded of this substance, but no melting point, and to it the formula $C_{40}H_{80}O_5$ (or the simpler expression $C_8H_{16}O$) has since been assigned.

It is apparent from present knowledge that the so-called "taraxacin" and "taraxacerin" of the above-mentioned authors could not have been pure or homogeneous substances. The statements which have subsequently been recorded in the literature respecting the proportion of "taraxacin" in taraxacum root, with the assumption that it represents a distinct bitter principle, are therefore quite illusory.

L. E. Sayre has more recently contributed a number of papers on the subject of taraxacum (*Proc. Amer. Pharm. Assoc.*, 1893, p. 77; 1894, p. 241; 1895, p. 203; 1896, p. 160; 1897, p. 223; 1898, p. 341), but his investigations do not appear to have resulted in the isolation of any definite constituent of the root.

The question regarding the occurrence of mannitol in taraxacum root was investigated many years ago by T. and H. Smith (*Pharm. J.*, 1849, **8**, 480), who conclusively proved that this compound does not pre-exist therein, but that it is formed when an extract of the root undergoes the so-called mucous or viscous fermentation. Its formation under these conditions would appear to permit of explanation by the fact that taraxacum root contains an abundance of inulin, which, on hydrolysis, is converted into lævulose, and the latter, by the special fermentative process referred to, becomes reduced to mannitol. The above observation has now also been confirmed by the present authors, inasmuch as no trace of mannitol could be isolated directly from the root employed for this research.

While the present investigation was in progress it has been recorded (*Brit. Med. J.*, May 25th, 1912, p. 1181) that the use of taraxacum in cases of cancer has been attended with remarkably beneficial results, and shortly afterwards (*ibid.*, July 13th, 1912, p. 97) attention was directed to the use of choline in the treatment of this disease. Additional interest is imparted to these two quite independent observations, especially when considered conjointly, by the fact that taraxacum root has now been found to contain choline. The various other well-defined compounds which have been isolated are summarized at the end of this paper.

EXPERIMENTAL.

The material employed for this investigation consisted of the best quality of English taraxacum root, which was collected in the autumn of 1911, and kindly supplied to us by Messrs. W. Ransom and Son, of Hitchin.

A small portion (25 grams) of the ground root was treated with Prollius' fluid, and the resulting product tested for an alkaloid with the usual reagents. The reactions obtained were so slight as to indicate the presence of not more than traces of an alkaloidal substance.

Another portion (20 grams) of the ground material was successively extracted in a Soxhlet apparatus with various solvents, and the resulting extracts dried in a water-oven until of constant weight:

Petroleum (b. p. 35—60°)	extracted	0.28 gram =	1.40 per cent.
Ether	extracted	0.06 gram =	0.30 per cent.
Chloroform	extracted	0.05 gram =	0.25 per cent.
Ethyl acetate	extracted	0.34 gram =	1.70 per cent.
Alcohol	extracted	2.33 gram =	11.65 per cent.
Water	extracted	10.20 gram =	51.00 per cent.
	Total	13.26 grams =	66.3 per cent.

In order to ascertain whether an enzyme were present, 200 grams of the air-dried root were extracted with cold water, and to the clear, filtered liquid about twice its volume of alcohol was added. A slight precipitate was thus produced, which, when collected and dried in a vacuum over sulphuric acid, could be reduced to a brown powder. This product, which amounted to 0.85 gram, very slowly hydrolysed amygdalin, and thus possessed some enzymic activity.

For the purpose of a complete examination of the constituents of the root, 22.9 kilograms of the dried, ground material were extracted by continuous percolation with hot alcohol. After the removal of the greater portion of the alcohol, 7.3 kilograms of a viscid, dark-colored extract were obtained.

One kilogram of the alcoholic extract, representing about 3.14 kilograms of the root, was examined for sucrose by the following method: The extract was first mixed with water to separate the resin, which was incorporated with the larger portion subsequently obtained, and designated as (*B*). The filtered, aqueous liquid was then treated with an excess of milk of lime, again filtered, and the alkaline filtrate saturated with carbon dioxide. This liquid, after filtration, was evaporated under diminished pressure to the consistency of a syrup, and the latter treated with successive portions of alcohol until a product was finally obtained, which dissolved completely in alcohol of about 85 per cent. strength. The solution of this product, when decolorised with a little animal charcoal and kept for several months, deposited no crystalline substance, and there was therefore no indication of the presence of sucrose.

Distillation of the Extract with Steam. Separation of an Essential Oil.

The entire remaining portion (6.3 kilograms) of the abovementioned alcoholic extract of the root was mixed with water, and distilled in a current of steam. The distillate was extracted with ether, the ethereal liquid dried, and the solvent removed, when a small amount of a dark yellow essential oil was obtained. This oil had a strong, persistent odor, and gave the color reaction for furfuraldehyde.

NON-VOLATILE CONSTITUENTS OF THE EXTRACT.

After the above-described operation there remained in the distillation flask a dark-colored aqueous liquid (*A*), together with a quantity of a soft, somewhat oily resin (*B*). The resinous material, the separation of which was attended with considerable difficulty, was finally washed thoroughly with warm water, and the washings added to the main portion of the aqueous liquid.

EXAMINATION OF THE AQUEOUS LIQUID (A).

The aqueous liquid, after concentration under diminished pressure, was extracted many times with ether. These ethereal liquids were united, the greater portion of the solvent removed, and the residue mixed with about an equal volume of light petroleum (b. p. 35—50°), when a red oil was deposited. On decanting and concentrating the supernatant liquid, and again treating it with light petroleum, further small quantities of red oil were obtained, which were added to the first portion. The mixture of ether and light petroleum was finally evaporated, the residue dissolved in ether, and the ethereal liquid shaken successively with aqueous ammonium carbonate, sodium carbonate, and sodium hydroxide. Each of these alkaline liquids was acidified, extracted with ether, and the solvent evaporated.

ISOLATION OF p-HYDROXYPHENYLACETIC ACID, $C_6H_4(OH).CH_2.CO_2H$.

The product obtained from the above-mentioned ammonium carbonate extract was a dark yellow oil. This was treated with hot water and a little animal charcoal, and the liquid filtered, when, on cooling, a gum-like mass separated, which gradually became crystalline. After recrystallisation from benzene containing a little ethyl acetate, a very small amount (about 0.05 gram) of an acidic substance was obtained, which separated in colorless needles, melting at 144—145°. The above-mentioned red oil, which was deposited by the addition of light petroleum to the concentrated ethereal liquid, was redissolved in ether, and extracted successively with aqueous alkalis, as already described. The ammonium carbonate extract thus obtained, when acidified, yielded a gum-like product, which was esterified. The acid was then regenerated from the ester and crystallised several times from ethyl acetate, when it separated in flat needles melting at 144—146°, and amounted to about 0.4 gram. It was identical with the small portion (0.05 gram) of acid first obtained. By the subsequent extraction of both portions of the original ethereal extract with sodium carbonate and sodium hydroxide respectively, only small amounts of dark-colored, amorphous products were obtained, from which nothing definite could be isolated.

The above-described acid was dried at 105° and analysed:

0.0632 gave 0.1451 CO_2 and 0.0294 H_2O. $C=62.6$; $H=5.2$.
0.0818 " 0.1894 CO_2 " 0.0379 H_2O. $C=63.1$; $H=5.1$.
0.1009 neutralised 32.5 c.c. $N/50$-KOH. M.W. (monocarboxylic acid) $=155$.
$C_8H_8O_3$ requires $C=63.1$; $H=5.3$ per cent. M.W. $=152$.

A determination of the molecular weight of the acid by Barger's microscopic method was kindly made for us by Mr. A. J. Ewins, B.Sc., with the following result:

0.048 in 1.196 of absolute alcohol, using *a*-naphthol as the standard, was between 0.26 and 0.275 mol. Mean M.W. = 150.

The acid was soluble in cold, and more readily in warm, water, as also in alcohol, ether, ethyl acetate, and acetone, but only slightly so in benzene or the higher boiling fractions of petroleum. Its dilute aqueous solution gave no perceptible coloration with ferric chloride. With Million's reagent it yielded the deep red color characteristic of the aromatic monohydroxy-acids (*Ber.*, 1879, **12**, 1452); and a trace of the substance, when heated with soda-lime, gave a distinct phenolic odor.

A consideration of the composition and characters of the above-described substance indicated it to be *p*-hydroxyphenylacetic acid, which has not previously been observed to occur as such in the vegetable kingdom. It was obtained by A. G. Perkin and Newbury (Trans., 1899, **75**, 834) by the action of potassium hydroxide on genistein, and Ewins and Laidlaw (*J. Physiol.*, 1910, **41**, 78) have shown that when *p*-hydroxyphenylethylamine is administered by the mouth to an animal, it is transformed to a large extent into *p*-hydroxyphenylacetic acid, which may subsequently be extracted from the urine.

In order completely to establish the identity of the substance above described with *p*-hydroxyphenylacetic acid, it was deemed desirable to compare it with the synthetic acid, especially as it had been stated by Salkowski (*Ber.*, 1879, 12, 1438), who first effected its synthesis, that its aqueous solution gives with ferric chloride a slight greyish-violet coloration, which immediately changes to a dirty greyish-green. It was, moreover, thought possible that the coloration given by the synthetic product might be due to a slight contamination with the corresponding ortho-compound, which is known to produce a violet color with ferric chloride. Baumann (*Ber.*, 1880, 13, 279), who obtained *p*-hydroxyphenylacetic acid from human urine, has, however, also noted that its aqueous solution gives with ferric chloride a slight violet coloration.

A quantity of the synthetic acid was accordingly prepared from phenylacetic acid, the latter having first been nitrated according to the method of Maxwell (*Ber.*, 1879, 12, 1765). After very prolonged fractional crystallisation from warm water, a product was obtained which melted at 152°, the pure *p*-nitrophenylacetic acid having been observed by Maxwell (*loc. cit.*) to melt at 150°, and by Bedson (*Trans.*, 1880, 37, 91) at 150—151°. This nitro-acid was reduced by tin and hydrochloric acid, and then, by means of the diazo-compound, converted into the corresponding hydroxy-acid. The acid thus prepared was found to have the same melting point as that obtained from taraxacum root, and when the two products were mixed no depression of the melting point ensued. The reaction with Millon's reagent was precisely the same as that previously mentioned. On comparing the behaviour of the natural and the synthetic acid towards ferric chloride, it was observed in both cases that if a fairly concentrated solution of the acid were employed a faint and exceedingly fugitive violet coloration was produced, rapidly changing to greenish-brown, thus confirming the observations of Salkowski and of Baumann (*loc. cit.*)

The above results thus completely established the identity of the acid from taraxacum root with *p*-hydroxyphenylacetic acid.

After the extraction of the original aqueous liquid with ether, as above described, it was shaken with eighteen successive portions of warm amyl alcohol. These amyl-alcoholic liquids were united, washed with water, concentrated under diminished pressure to the consistency of a syrup, and the last traces of amyl alcohol removed by passing steam through the liquid. The syrupy product was then further concentrated under diminished pressure, afterwards on a water-bath, and finally dried as completely as possible in a vacuum desiccator. There was thus obtained a quantity (42.5 grams) of a dark brown, viscous mass, which possessed a strongly bitter taste, and in aqueous solution gave a dark green color with ferric chloride.

Twelve grams of the above-mentioned product were heated for two hours with 5 per cent. sulphuric acid in aqueous alcohol. On subsequently distilling the mixture in a current of steam, a very small amount of a yellow oil was obtained, which gave the color reaction of furfuraldehyde. The aqueous acid liquid was then extracted many times with ether, after which the sulphuric acid was removed by barium hydroxide, the excess of the latter by carbon dioxide, and the filtered liquid concentrated. From this syrupy product a small amount of an osazone (m. p. 210—211°) was prepared, thus indicating that some glucosidic material was contained in the amyl alcoholic extract. The above-mentioned ethereal extract of the aqueous acid liquid was thoroughly extracted with aqueous ammonium carbonate, after which the ethereal liquid was dried and evaporated, but only a trace of yellow, amorphous material remained. On acidifying the ammonium carbonate extract, however, extracting many times with ether, and evaporating the solvent, a small amount of a crystalline substance was deposited. After recrystallisation from ethyl acetate this was obtained in thin, flat needles, melting at 146°, and was identical with the *p*-hydroxyphenylacetic acid, $C_8H_8O_3$, previously described. (Found, $C=62.5$; $H=5.4$. Calc., $C=63.1$; $H=5.3$ per cent.) The amount thus obtained was only 0.09 gram.

Another portion (27 grams) of the above-mentioned amyl-alcoholic extract was heated for a few minutes with a 10 per cent. solution of potassium hydroxide; the mixture then rapidly cooled and acidified, when a quantity of resinous material separated. This was collected, mixed with purified sawdust, and the dried mixture thoroughly extracted with ether. The aqueous acid liquid from which the resin had been removed was likewise extracted many times with ether, after which the two ethereal liquids were united and extracted with aqueous ammonium carbonate. On subsequently evaporating the ether there remained a slight residue, from which a crystalline substance melting at 233—235° was obtained. This substance was very soluble in chloroform, almost insoluble in ethyl acetate, and gave no coloration with ferric chloride, but the amount obtained (0.04 gram) was too small to permit of its further examination. The ammonium carbonate extract, when acidified and extracted with ether, yielded a small amount of a semi-crystalline product, which was readily soluble in warm water, and its solution gave with ferric chloride a deep green color. The whole of this product was heated with chloroform containing a trace of ethyl acetate, when a small amount of a brown substance remained undissolved. The latter was crystallised from very dilute alcohol, when 0.07 gram of an acid was obtained, which melted and decomposed at 214°, and gave a deep green color with ferric chloride. This substance was evidently 3:4-dihydroxycinnamic acid, since no depression of the melting point ensued when mixed with a pure specimen of the respective acid, and it was subsequently obtained in an amount which permitted of its complete identification, as will be further noted. The portion of the above-mentioned product which had dissolved in the mixture of chloroform and ethyl acetate formed, after the evaporation of the solvent, a viscid mass, which was repeatedly extracted with boiling benzene. From the latter liquid some crystals were deposited, which, after several crystallisations from benzene containing a little alcohol, separated in flat needles melting at 145—146°. This substance amounted to 0.25 gram, and was identified as *p*-hydroxyphenylacetic acid. (Found, $C = 62.6$; $H = 5.4$. Calc., $C = 63.1$; $H = 5.3$ per cent.)

After the extraction of the original aqueous liquid with amyl alcohol, as above described, the last traces of the latter were removed by a current of steam. The liquid was then treated with a solution of basic lead acetate until no further precipitate was produced, the precipitate collected and thoroughly washed with water, the washings being added to the main portion of the filtered liquid.

ISOLATION OF 3:4-DIHYDROXYCINNAMIC ACID,
$C_6H_3(OH)_2.CH:CH.CO_2H$.

A portion of the above-mentioned basic lead acetate precipitate, representing 2 kilograms of the original alcoholic extract, was suspended in water, decomposed by hydrogen sulphide, and the mixture filtered. The filtered liquid was then concentrated under diminished pressure to the consistency of a thin syrup. It gave a dark brown coloration with ferric chloride, but no precipitate with gelatin, thus indicating the absence of tannin, and it also gave no reaction with potassium-mercuric iodide. As nothing separated from the liquid on keeping, it was heated to boiling, neutralised with potassium hydroxide, and sufficient of a concentrated solution of the latter added to represent about 10 per cent. of the mixture, after which it was boiled for about five minutes. The liquid was then poured into dilute sulphuric acid, and, after cooling, the mixture was extracted many times with ether, the combined ethereal liquids being subsequently extracted with aqueous ammonium carbonate and sodium hydroxide. Nothing of interest was removed by the last-mentioned alkali, and on finally evaporating the ether only a trace of amorphous material remained. The ammonium carbonate extract, however, after acidification and extraction with ether, yielded a product which gave with ferric chloride a dark green color. From this product, after several crystallisations from hot water containing a little alcohol, a small amount (about 0.2 gram) of an acid was obtained, which melted and decomposed at 214—216° with evolution of gas. It was dried at 110°, and analysed:

0.0643 gave 0.1405 CO_2 and 0.0265 H_2O. $C = 59.6$; $H = 4.6$.
$C_9H_8O_4$ requires $C = 60.0$; $H = 4.4$ per cent.

The above-described substance was thus definitely identified as 3:4-dihydroxycinnamic acid, a smaller amount of which had previously been obtained from the amyl-alcoholic extract of the original aqueous liquid.

The filtrate from the precipitate produced by basic lead acetate was treated with hydrogen sulphide for the removal of the excess of lead, again filtered, and concentrated under diminished pressure to the consistency of a syrup. It evidently contained an abundance of sugar, since it readily yielded *d*-phenylglucosazone, melting at 204—206°. A portion of the syrup was acetylated, but as nothing crystalline separated from the product, even after long keeping, it was finally hydrolysed. The regenerated sugar was then found to be strongly lævorotatory, thus indicating that it must have consisted, to a large extent at least, of lævulose. Another portion of the syrup was heated for about two hours with 5 per cent. sulphuric acid, but, with the exception of traces of furfuraldehyde, it yielded nothing definite by this treatment. A further portion of the syrup was mixed with purified sawdust, and the dried mixture extracted successively in a Soxhlet apparatus with ether, chloroform, and ethyl acetate, but only small amounts of sugary material were thus removed.

The original syrupy liquid, when heated with an alkali hydroxide developed a strongly basic, ammoniacal odour, and it gave an appreciable precipitate with a solution of iodine in potassium iodide.

ISOLATION OF CHOLINE, $C_5H_{15}O_2N$.

The main portion of the above-mentioned syrupy aqueous liquid was thoroughly extracted with alcohol, the resulting liquid evaporated, and the residue from the latter repeatedly treated with alcohol, in the same manner, until a product was finally obtained which was soluble in nearly absolute alcohol. By this means a large proportion of the sugar was eliminated, together with any other material which was sparingly soluble in alcohol. To the alcoholic solution thus obtained a saturated alcoholic solution of mercuric chloride was added, and the mixture kept in a closed vessel for a week. The precipitate which had then formed was collected, washed with a little alcohol, dissolved as completely as possible in warm water, and the solution filtered. The mercury was subsequently removed from this solution by hydrogen sulphide, the liquid again filtered, neutralised with sodium carbonate, then slightly acidified with hydrochloric acid, and finally evaporated to dryness, for the most part in a vacuum desiccator. The dry residue was treated with absolute alcohol, the filtered liquid evaporated, and the residue repeatedly so treated until free from inorganic salt. A relatively small amount of a nearly colorless product was thus obtained, which deliquesced on exposure to the air, and the aqueous solution of which was precipitated by the usual alkaloidal reagents, as also by gold chloride. It possessed, in fact, all the recognised properties of choline chloride. A small portion of the substance was dissolved in a little water, and precipitated by a solution of auric chloride, the pale yellow precipitate being collected, washed with a little water, and dried at 100—105°:

0.0332 gave on ignition 0.017 Au. Au = 44.3.

$C_5H_{14}ONCl,AuCl_3$ requires Au = 44.5 per cent.

Another portion of the substance was dissolved in absolute alcohol, and a solution of platinic chloride added. The resulting precipitate was collected, washed with a little alcohol, and dissolved in a small amount of water. After keeping for some time, reddish-brown plates were deposited, which melted and decomposed at 250—254°:

0.0460, when heated at 110°, lost 0.0010 H_2O. $H_2O = 2.2$.
0.0450[2] gave on ignition 0.0143 Pt. $Pt = 31.8$.
0.0844[2] gave on ignition 0.0269 Pt. $Pt = 31.9$.
$(C_5H_{14}ONCl)_2PtCl_4,H_2O$ requires $H_2O = 2.8$ per cent.
$(C_5H_{14}ONCl)_2PtCl_4$ requires $Pt = 31.7$ per cent.

The occurrence of choline as a constituent of taraxacum root has thus been established.

EXAMINATION OF THE RESIN (B).

The crude resinous material which had been separated from the aqueous liquid (*A*), as previously described, was dissolved in alcohol, mixed with purified sawdust, and the thoroughly dried mixture extracted successively in a large Soxhlet apparatus with various solvents. The weights of the products, as determined by drying small, aliquot portions in a water-oven, were as follows:

Petroleum (b. p. 35—50°)	extracted	329.6 grams.
Ether	extracted	19.6 grams.
Chloroform	extracted	10.0 grams.
Ethyl acetate	extracted	10.5 grams.
Alcohol	extracted	40.0 grams.
Total........		409.7 grams.

As the above amount of resin was obtained from 7.3 kilograms of the original alcoholic extract, it is equivalent to about 1.8 per cent. of resin in the air-dried root.

PETROLEUM EXTRACT OF THE RESIN.

IDENTIFICATION OF THE FREE FATTY ACIDS.

After the removal of the solvent from the petroleum extract the residue was dissolved in ether, and the ethereal liquid shaken successively with aqueous ammonium carbonate, sodium carbonate, and sodium hydroxide. The clear, alkaline liquids yielded, on acidification, only traces of fatty material, but both the sodium carbonate and sodium hydroxide produced, to some extent, emulsions, which were separated, and the ether removed, when a solid product was obtained. This consisted of the sodium salt of fatty acids. It was suspended in dilute sulphuric acid and warmed with chloroform, which removed about 15 grams of fatty acids. The latter were converted into their methyl esters, which were distilled three times under diminished pressure, and three fractions collected. The first two fractions consisted of methyl palmitate, melting at 27—28°. (Found, $C = 75.0$; $H = 12.7$. Calc., $C = 75.5$; $H = 12.6$ per cent.) The third fraction, which distilled at 206—208°/15 mm., was liquid and unsaturated:

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[2] Anhydrous substance.

0.2933 absorbed 0.3164 iodine. Iodine value = 107.9.

For the further examination of this fraction it was converted into a lead salt, and the latter treated with ether. The portion insoluble in ether, when decomposed by hydrochloric acid, yielded 1.5 grams of a solid acid, which distilled between 230° and 235°/27 mm., and, after crystallisation, melted at 60—61°. It was identified as palmitic acid. (Found, $C = 75.0$; $H = 12.8$. Calc., $C = 75.0$; $H = 12.5$ per cent.) The portion of lead salt which was soluble in ether, when decomposed by hydrochloric acid, yielded 7 grams of liquid acids, which distilled between 220° and 235°/12 mm.:

0.1134 gave 0.3200 CO_2 and 0.1188 H_2O. $C = 76.9$; $H = 11.6$.
0.3898 absorbed 0.6111 iodine. Iodine value = 156.8.

These results indicate that the liquid acids consisted essentially of a mixture of oleic and linolic acids, the latter predominating.

The ethereal liquid which had been shaken with aqeous alkalis, as above described, was subsequently evaporated, and the residue heated with an alcoholic solution of potassium hydroxide. The alcohol was then evaporated, water added, and the alkaline mixture extracted with ether, when a quantity of unsaponifiable material was removed, which will subsequently be described.

IDENTIFICATION OF THE COMBINED FATTY ACIDS.

ISOLATION OF MELISSIC ACID, $C_{30}H_{60}O_2$.

During the above-mentioned extraction of the alkaline liquid with ether, a slight emulsion was formed. This was thoroughly washed with ether, then freed from the latter, and brought on a filter. A small amount of substance was thus collected, which proved to be the potassium salt of a fatty acid. The acid was liberated, dissolved in chloroform, and crystallised from ethyl acetate, when it melted at 87.5—88.5°, and amounted to 0.1 gram:

0.0821 gave 0.2399 CO_2 and 0.0983 H_2O. $C = 79.7$; $H = 13.3$.
$C_{30}H_{60}O_2$ requires $C = 79.7$; $H = 13.3$ per cent.

The small remaining portion of the acid was converted into its methyl ester, which, after crystallisation from alcohol, melted at 72—73°.

The above-described acid was thus identified as melissic acid, which, so far as is known to us, has never previously been obtained directly from a plant.

The aqueous alkaline liquid from which the unsaponifiable material had been removed by extraction with ether, as above described, was acidified and again extracted with ether. This ethereal liquid was dried, the solvent removed, and the residual fatty acids converted into their methyl esters. The latter, when distilled under diminished pressure, passed over between 180° and 270°/9 mm., and amounted to about 55 grams. They were optically inactive. The esters were then hydrolysed, and the resulting product, which consisted of a mixture of saturated and unsaturated acids, was separated into liquid and solid portions by means of the lead salts.

The Liquid Acids.—These acids, when distilled under diminished pressure, passed over between 215° and 265°/18 mm., and amounted to about 40 grams. An analysis and a determination of the iodine value gave the following results:

0.1343 gave 0.3800 CO_2 and 0.1393 H_2O. $C = 77.2$; $H = 11.5$.
0.3100 absorbed 0.4448 iodine. Iodine value = 143.5.
$C_{18}H_{34}O_2$ requires $C=76.6$; $H=12.1$ per cent. Iodine value = 90.1.
$C_{18}H_{32}O_2$ " $C=77.1$; $H=11.4$ " " " " =181.4.
$C_{18}H_{30}O_2$ " $C=77.7$; $H=10.8$ " " " " =274.1.

The above results would indicate that the liquid acids consisted chiefly of a mixture of oleic and linolic acids, with possibly a little linolenic acid.

The Solid Acids.—These acids, which amounted to 10 grams, were fractionally crystallised from ethyl acetate. The least soluble fraction so obtained separated in small needles, which melted quite constantly at 82—84°:

0.0673 gave 0.1946 CO_2 and 0.0820 H_2O. $C = 78.8$; $H = 13.5$.
$C_{27}H_{54}O_2$ requires $C = 79.0$; $H = 13.2$ per cent.

This acid was thus identified as cerotic acid, although the melting point was somewhat higher than that usually assigned to it.

The next two fractions, of lower melting point (75—77°), also appeared to consist essentially of cerotic acid, since they gave on analysis the following figures: $C = 78.5$; $H = 13.2$ per cent.

The most readily soluble fractions, which melted at 56—58°, were distilled under diminished pressure, when practically the whole passed over between 205° and 207°/12 mm. After one crystallisation of the product it melted at 60—61°, and was identified as palmitic acid. (Found, $C = 75.0$; $H = 12.7$. Calc., $C = 75.0$; $H = 12.5$ per cent.)

UNSAPONIFIABLE CONSTITUENTS OF THE PETROLEUM EXTRACT.

The ethereal liquid, obtained by extracting the hydrolysed petroleum extract of the resin with ether, as above described, was dried, and the solvent removed, when 125 grams of a yellow solid were obtained. An attempt was first made to separate the constituents of this material by direct fractional crystallisation, but, as this was unsuccessful, the various fractions were separately acetylated, and the resulting products subjected to prolonged fractional crystallisation. The solvents employed for this purpose were ethyl acetate and a mixture of the latter with alcohol.

ISOLATION OF A NEW MONOHYDRIC ALCOHOL, TARAXASTEROL, $C_{29}H_{47}.OH$.

After many crystallisations of the above-mentioned acetylated products, a small fraction (5.2 grams) was obtained, which separated in handsome, colourless, hexagonal plates, melting at 251—252°, and this melting point was not changed by further crystallisation. A portion of this acetyl derivative was hydrolysed by boiling it for three or four hours with an alcoholic solution of potassium hydroxide, after which the alcohol was for the most part removed, water added, and the resulting solid collected. On crystallisation from alcohol, it separated in long, colorless needles, melting at 221—222°:

0.1999, when heated at 125°, lost 0.0198 H_2O. $H_2O = 9.9$.
0.0848 [3] gave 0.2625 CO_2 and 0.0902 H_2O. $C = 84.4$; $H = 11.8$.
0.0737 [3] " 0.2284 CO_2 " 0.0772 H_2O. $C = 84.5$; $H = 11.6$.
$C_{29}H_{48}O,2\frac{1}{2}H_2O$ requires $H_2O = 9.8$ per cent.
$C_{29}H_{48}O$ requires $C = 84.5$; $H = 11.6$ per cent.

It is evident from these results that the above-described compound possesses the formula $C_{29}H_{48}O$, and, being a new alcohol, having properties similar to those of the phytosterols, it is proposed to designate it *taraxasterol*, with reference to the source from which it has been obtained.

A determination of its optical rotatory power gave the following result:

0.4343 [3] made up to 20 c.c. with chloroform, gave α_D +4° 11′ in a 2-dcm. tube, whence $[\alpha]_D$ +96.3°.

Taraxasterol is homologous with two monohydric alcohols previously isolated in these laboratories from the rhizome of *Apocynum androsæmifolium*, namely androsterol, $C_{30}H_{50}O$, and homo-androsterol, $C_{27}H_{44}O$ (Trans., 1909, **95**, 739), and it gives a color reaction similar to that yielded by the last-mentioned compounds; thus, if a small amount of the substance be dissolved in chloroform with a little acetic anhydride, and a few drops of concentrated sulphuric acid subsequently added, a pink color is produced, which slowly changes to a dark magenta with a green fluorescence, and this color persists for several hours. The above-mentioned alcohols, together with a homologue of taraxasterol to be subsequently described, $C_{25}H_{40}O$, constitute four members of a group which is represented by the general formula $C_nH_{2n-10}O$.

Acetyltaraxasterol, $C_{29}H_{47}O.CO.CH_3$.—This compound (m. p. 251—252°), the preparation and characters of which have already been described, was dried at 120° and analysed:

0.0866 gave 0.2602 CO_2 and 0.0854 H_2O. $C = 81.9$; $H = 10.9$.
0.0824 " 0.2472 CO_2 " 0.0810 H_2O. $C = 81.8$; $H = 10.9$.
$C_{31}H_{50}O_2$ requires $C = 81.9$; $H = 11.0$ per cent.

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[3] Dried at 120°.

A determination of its optical rotatory power gave the following result:

0.2046,[4] made up to 20 c.c. with chloroform, gave α_D +2° 30′ in a 2-dcm. tube, whence $[\alpha]_D$ +122.2°.

Monobromoacetyltaraxasterol, $C_{29}H_{46}BrO.CO.CH_3$.—Half a gram of the above-described acetyl derivative was dissolved in chloroform, and to the cold solution a slight excess of a solution of bromine in the same solvent was slowly added. The product was crystallised from ethyl acetate, when it separated in small, colorless needles, melting at 233—234°:

0.1204 gave 0.0421 AgBr. Br. = 14.9.
$C_{31}H_{49}O_2Br$ requires Br = 15.0 per cent.

Benzoyltaraxasterol, $C_{29}H_{47}O.CO.C_6H_5$.—This derivative was prepared by heating the respective alcohol for a short time with benzoyl chloride and a few drops of pyridine. The product, after several crystallisations from a mixture of alcohol and chloroform, separated in glistening leaflets melting at 232°:

0.0810[5] gave 0.2471 CO_2 and 0.0728 H_2O. C = 83.2; H = 10.0.
$C_{36}H_{52}O_2$ requires C = 83.7; H = 10.1 per cent.

Other well-crystalised fractions obtained from the original acetylated product above described possessed the following characters:

I. M. p. 216—222°; $[\alpha]_D$ +68.1°; C = 81.7; H = 10.9 per cent.
II. M. p. 225—227°; $[\alpha]_D$ +62.2°; C = 81.5; H = 11.1 " "
III. M. p. 225—235°; $[\alpha]_D$ +77.8°; C = 81.6; H = 11.3 " "

The composition and characters of these fractions indicated them to contain a substance analogous to taraxasterol, but having a lower melting point and a lower optical rotation. The mother-liquors from these fractions were evaporated, and the residues brominated. By the fractional crystallisation of the product, a further amount of the above-described monobromoacetyltaraxasterol was obtained.

Fractions of the acetylated product melting lower than those above mentioned could only be crystallised with difficulty. The mother liquors from these fractions were evaporated to dryness, the residues hydrolysed, and then treated with phthalic anhydride, both in the dry state and with the admixture of a little pyridine or xylene. No acid phthalic ester could, however, be isolated by this treatment.

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[4] Dried at 120°.
[5] Dried at 120°.

ISOLATION OF A NEW MONOHYDRIC ALCOHOL, HOMOTARAXASTEROL, $C_{25}H_{39}.OH$.

The above-mentioned difficultly crystallisable fractions of acetylated material were united, hydrolysed, and the product distilled under diminished pressure, when practically the whole passed over between 335° and 340°/25 mm. The distillate, which was contaminated with some oily material, was purified by dissolving it in petroleum of high boiling point, and treatment with animal charcoal. A product was thus obtained, which, after several crystallisations from dilute alcohol, separated in small needles melting constantly at 163—164°. The substance did not undergo any appreciable loss in weight on drying at 120°, and the total amount obtained was 0.45 gram:

0.0741 gave 0.2280 CO_2 and 0.0770 H_2O. $C = 83.9$; $H = 11.5$.
$C_{25}H_{40}O$ requires $C = 84.3$; $H = 11.2$ per cent.

The composition of this substance clearly indicated it to be a lower homologue of the above-described taraxasterol, and it yielded precisely the same color reaction as the latter. Being also a new compound it is proposed to designate it *homotaraxasterol*.

A determination of its optical rotary power gave the following result:

0.0989, made up to 20 c.c. with chloroform, gave $\alpha_D + 0° 15'$ in a 2-dcm. tube, whence $[\alpha]_D + 25.3°$.

Acetylhomotaraxasterol, $C_{25}H_{39}O.CO.CH_3$.—This compound was prepared by heating the respective alcohol with acetic anhydride. It separated from a mixture of ethyl acetate and alcohol in small, colorless needles, melting at 219—220°:

0.0654 gave 0.1943 CO_2 and 0.0645 H_2O. $C = 81.0$; $H = 10.9$.
$C_{27}H_{42}O_2$ requires $C = 81.4$; $H = 10.5$ per cent.
0.0888, made up to 20 c.c. with chloroform, gave $\alpha_D + 0° 15'$ in a 2-dcm. tube, when $[\alpha]_D + 28.1°$.

A very small portion of homotaraxasterol was converted into its *benzoyl* derivative, which separated from a mixture of chloroform and alcohol in small, flat needles, melting at 202°. The amount of this compound was not sufficient for analysis.

ETHER EXTRACT OF THE RESIN.

This extract was considerably concentrated in volume and kept for some time, when a small amount of a sparingly soluble grey substance was deposited. This was collected, and the clear, etheral liquid then extracted successively with aqueous ammonium carbonate and sodium carbonate, which, however, removed only traces of brown, amorphous material. The ethereal liquid was finally extracted with aqueous potassium hydroxide, and the alkaline liquid acidified and extracted with ether, which removed some amorphous material, and at the same time an emulsion was formed. This was separated, washed with a little ether, and the latter removed by a current of air, when, on filtration, a further small amount of the above-mentioned grey substance was obtained. The ethereal liquid which had been extracted with alkalis when dried and evaporated, also yielded a little of the same sparingly soluble grey substance.

ISOLATION OF CLUYTIANOL, $C_{29}H_{46}O(OH)_4$.

The above-described grey substance was first subjected to prolonged extraction with absolute alcohol in a Soxhlet apparatus. During this operation it was partly deposited in a nearly white condition, and, on finally concentrating the alcoholic liquid, practically all the substance separated. The material thus obtained amounted to 4.1 grams. It was subsequently heated with acetic anhydride, and the resulting product fractionally crystallised many times from alcohol, when an acetyl derivative was obtained, which separated in colorless, flat needles, melting at 161°.

A portion of the acetyl derivative was hydrolysed by boiling with an alcoholic solution of potassium hydroxide. The product, after crystallisation from dilute pyridine, separated in minute, colorless crystals, melting and decomposing at 297°:

0.0826 gave 0.2197 CO_2 and 0.0790 H_2O. $C = 72.5$; $H = 10.6$.
$C_{29}H_{50}O_5$ requires $C = 72.8$; $H = 10.5$ per cent.

Although this substance agrees in its empirical composition with ipuranol, $C_{29}H_{47}O_2(OH)_3$, a trihydric alcohol which has been obtained in these laboratories from many sources, and also yields the same colour reaction as ipuranol, the analysis and characters of its derivatives proved it to be identical with a new tetrahydric alcohol, $C_{29}H_{46}O(OH)_4$, recently isolated by Tutin and Clewer from the South African plant *Cluytia similis*, Muell. Arg., and designated by them cluytianol (*Trans. Chem. Soc.*, vol. 101, p. 2230).

Tetra-acetylcluytianol, $C_{29}H_{46}O_5(CO.CH_3)_4$.—This compound (m. p. 161°) was prepared as above described:

0.0820 gave 0.2064 CO_2 and 0.0673 H_2O. C = 68.6; H = 9.1.

Its molecular weight was determined by Mr. H. W. B. Clewer:

0.4326, in 26.45 of benzene, gave Δt—0.12°. M.W. = 668.
$C_{37}H_{58}O_9$ requires C = 68.7; H = 9.0 per cent. M.W. = 646.

A determination of its optical rotatory power gave the following result:

0.1976, made up to 20 c.c. with ethyl acetate, gave α_D —0° 24′ in a 2-dcm tube, when $[\alpha]_D$ —20.2°.

Tetrabenzoylcluytianol, $C_{29}H_{46}O_5(CO.C_6H_5)_4$.—A little of this compound was prepared by treating the respective alcohol with benzoyl chloride in the presence of pyridine. The product, after repeated crystallisation from a mixture of chloroform and alcohol, separated in small, colorless needles, melting at 196°:

0.0620 gave 0.1733 CO_2 and 0.0443 H_2O. C = 76.2; H = 7.9.
$C_{57}H_{66}O_9$ requires C = 76.5; H = 7.4 per cent.

CHLOROFORM, ETHYL ACETATE, AND ALCOHOL EXTRACTS OF THE RESIN.

These extracts were dark brown, amorphous products, and amounted to 10, 10.5, and 40 grams respectively. They were separately examined, but nothing definite could be isolated from them. The ethyl acetate and alcohol extracts were therefore heated with dilute sulphuric acid in aqueous alcohol, and the mixture distilled in a current of steam. The distillate contained traces of an oily substance, which gave the color reaction of furfuraldehyde, but no sugar appeared to be produced, and the extracts were evidently not glucosidic.

SUMMARY AND CONCLUSIONS.

The material employed for this investigation consisted of the air-dried, fresh roots of taraxacum (*Taraxacum officinale,* Wiggers), collected in the autumn from plants grown in England.

The roots were found to contain a very small amount of an enzyme, which slowly hydrolysed amygdalin.

An alcoholic extract of the root, when distilled in a current of steam, yielded a small amount of a yellow essential oil. From the portion of the extract which was soluble in water, the following substances were isolated: (i) *p*-hydroxyphenylacetic acid, $C_8H_8O_3$ (m. p. 144—146°); (ii) 3:4-dihydroxycinnamic acid, $C_9H_8O_4$ (m. p. 214—216°); (iii) a small amount of choline, $C_5H_{15}O_2N$, which was identified by its gold and platinum compounds. The aqueous liquid contained, furthermore, a considerable quantity of a lævorotatory sugar, which appeared to consist chiefly, if not entirely, of lævulose, and yielded an osazone, melting at 204—206°.

The portion of the alcoholic extract which was insoluble in water consisted of a soft, oily resin, which amounted to 1.8 per cent. of the weight of the root. From this material the following compounds were isolated: (i) a new monohydric alcohol, *taraxasterol*, $C_{29}H_{47}.OH$ (m. p. 221—222°; $[\alpha]_D + 96.3°$), which yielded an *acetyl* derivative (m. p. 251—252°; $[\alpha]_D + 122.2°$), a *monobromoacetyl* derivative (m. p. 233—234°), and a *benzoyl* derivative (m. p. 232°); (ii) a new monohydric alcohol, *homotaraxasterol*, $C_{25}H_{39}.OH$ (m. p. 163—164°; $[\alpha]_D + 25.3°$), which yielded an *acetyl* derivative (m. p. 219—220° $[\alpha]_D + 28.1°$), and a *benzoyl* derivative (m. p. 202°). The above-mentioned alcohols, together with two previously isolated compounds, androsterol, $C_{30}H_{49}.OH$, and homoandrosterol, $C_{27}H_{43}.OH$ (*Trans.*, 1909, **95**, 739), constitute an homologous group, which is represented by the general formula $C_nH_{2n-10}O$; (iii) Cluytianol, $C_{29}H_{46}O(OH)_4$, melting at 297° (*Trans.*, 1912, p. 2230), from which the tetra-acetyl and tetrabenzoyl derivatives were prepared; (iv) palmitic, cerotic, and melissic acids, together with a mixture of unsaturated acids, consisting chiefly of oleic and linolic acids, with, apparently, a little linolenic acid.

The bitter taste of taraxacum, which has hitherto been ascribed to the so-called "taraxacin," appears to be due chiefly to dark-colored, amorphous material, and not to any distinct principle. It was found, for example, that the portion of an alcoholic extract of the root which is soluble in water, when repeatedly extracted with warm amyl alcohol, yielded a viscous product, which possessed an intensely bitter taste.

A consideration of the results of the present investigation renders it evident that the products which many years ago received the designations of "taraxacin" and "taraxacerin" were not only indefinite in character, but must have consisted of very complex mixtures. It is therefore desirable that these names should no longer be retained in the literature.

THE WELLCOME CHEMICAL RESEARCH LABORATORIES,
LONDON, E. C.

ABSTRACT FROM THE REPORT OF THE CONNECTICUT AGRICULTURAL EXPERIMENT STATION.

BY JOHN K. THUM, PH.G., Philadelphia, Pa.

In part II of the annual report of the Connecticut Agricultural Experiment Station an interesting account is given of the work done for the year 1912 in connection with food and drug products.

"This station is required by law to make examinations of food and drug products, to publish its findings, and to report to the dairy and food commissioner all cases of adulteration or misbranding which are discovered."

Among the food products investigated we might mention the following: canned goods, dried fruits, gluten and special foods, honey, (which is chiefly adulterated with cane sugar), commercial glucose and invert sugar, rice, and sausage.

Drug products examined were acetic acid, aconite, glycerine, herion, magnesium carbonate, solution of magnesium citrate, paregoric, sodium salicylate, precipitated sulphur, and turpentine.

It was also interesting to note that some attention was given by the Station to exposing some proprietary medicines that are advertised and sold to the public. The statement is made, and it is well-known among pharmacists or should be, that even when the claimed ingredients are present in a proprietary remedy, as a rule the purchaser pays an exorbitant price for it.

The work of this Station in its effort to put the proprietary or "patent medicine" evil in its proper light before the public is in line with the good work done by the Council on Pharmacy and Chemistry of the American Medical Association. And its work, backed by the power and force of a State, should be of great value in informing and educating the people to the evil effects of nostrum medication. The leaven is working and it is only a question of time when work of this sort will be reënforced with coöperation by the daily newspapers.

For obvious reasons the newspapers are silent on these matters now. But they will, in due course, learn that the advocacy of measures designed for the public welfare must eventually rebound to *their* welfare and credit.

Publicity of the sort that only the daily newspaper can give is needed before the great mass of the people is reached on this vital question of public health.

Of the score or more of remedies examined we give brief abstracts of the following:

Schenk's Pulmonic Syrup.—"The 70-year-old Standard Remedy for Consumption, Coughs, Colds, Diseases of the Lungs and Respiratory Organs." This remarkable remedy for consumption, upon analysis, was shown to be a wintergreen-flavored mixture of saccharine syrups, 96.4 per cent. of the solids consisting of sugars.

The following is a summary of the analysis:

Specific gravity at 15.5° C.	1.3861
Alcohol	none
Glycerine	none
Solids	75.59
Sucrose	34.49
Invert sugar	38.40
Ash	0.08
Oil of wintergreen	present
Alkaloids	none

Syrup of Figs.—This proprietary medicine has been on the market for a number of years. Formerly it was sold under the name Syrup of Figs, recently though many of the labels note the presence of Elixir of Senna, which is generally the real laxative. The reason for this change is apparent from the following extract from the opinion of the U. S. Court in the case, Worden v. California Fig Syrup Co., 187 U. S., 516, 536:

"The argument for complainant is that, because fig juice or syrup has no laxative property, everybody ought to understand that when the term is used to designate a laxative medicine it must have only a fanciful meaning. But the fact is admitted that the public believe that fig juice or syrup has laxative medicinal properties. It is to them that the complainant seeks to sell its preparations, and it is with respect to their knowledge and impression that the character, whether descriptive or fanciful, of the term used, is to be determined." Of the 13 samples analyzed, 6 were sold as compound fig syrup, 5 as compound fig and senna syrup, and 2 as fruit laxative. Nearly all contained Epsom or Rochelle salt without the fact appearing on the label.

One preparation, bearing the A. D. S. label, bears the statement: "This is not a patent medicine, etc.," which raises the question whether a preparation made by a druggist or a group of druggists may not be quite as much a patent medicine as if made by a quack doctor or a seemingly reputable house.

A. D. S. Rheumatic Remedy.—An examination of this preparation by the Experiment Station showed it to contain potassium iodide and sodium salicylate (both well-known specifics for rheumatism) and an alcohol-glycerine infusion of a small amount of an unidentified vegetable drug, to which the trace of alkaloids found may be due.

A summary of the analysis is as follows:

Specific gravity at 15.5° C.	1.1015
Alcohol by volume	5.70
Solids	23.40
Glycerine	9.80
Ash	7.90
Potassium iodide	6.45
Sodium salicylate	6.13
Alkaloids	trace
Phenolphthalein	absent

The label on the container also gave notice "That this is not a patent medicine."

Dr. Franck's Grains of Health.—Upon examination the "grains of health" proved to be pills of aloes, coated with silver, and costing the consumer at the rate of $33.19 per pound.

Dr. Williams' Pink Pills for Pale People.—The color of the pills is due to cochineal and the active ingredients detected were iron oxide and magnesium sulphate and a faint trace of alkaloids.

The makers of this nostrum state that the pills are "Not a cure-all" yet on further reading of label we find that they are recommended for all diseases resulting from impoverished blood, a long list of female complaints, for many nervous disorders, such as St. Vitus' dance, paralysis and locomotor ataxia, and for male disorders arising from excesses, etc.; surely a rather wide field.

Thialion.—In the literature sent to physicians and in its advertisements Thialion is stated to be "a laxative salt of lithia" of the following formula: "$3Li_2O$, NaO, So_3, 7HO," and sodio-trilithic anhydrosulphate is given as its name. Upon analysis it was shown to be simply a mixture of sodium citrate and sodium sulphate with very small amounts of lithium citrate and sodium chloride.

Poslam.—A grayish ointment with a strong, tarry odor, sold in tin cans containing 20.5 gms., and cost 50 cents. Upon analysis showed the presence of:

Zinc oxide	11.47
Sulphur	6.55
Starch, anhydrous	19.45
Tar oil	14.40
Menthol	present
Salicylic acid	present

Fatty base, probably petrolatum, sufficient to make 100 parts. The active ingredients are zinc oxide, tar oil and sulphur. "These have long been used and known as more or less effectual remedies for the treatment of skin affections, but certainly do not warrant such claims as are made in the advertising matter sent out with Poslam stating it to be 'The newest medical discovery for the treatment of eczema, and all other skin affections and entirely different from anything yet used'" (Puckner and Hilpert).

Since the passage of the Federal Food and Drugs Act Lemon Extract and Asafetida have been much-discussed articles of commerce.

Lemon Extract.—A sample of French's Triple Strength Lemon Extract contained no lemon oil, and was colored with napthol yellow S, a permitted coal-tar dye. The carton claimed "triple strength," the bottle "genuine extract," and a sticker on both the carton and bottle stated in very fine print that it contained "no" lemon oil, a series of inconsistent and misleading statements clearly making the sample misbranded.

Asafetida, Powdered.—Eleven samples were examined, ten of which failed to come up to U. S. P. requirements for alcohol-soluble resin and ash content. The U. S. P. allows an ash content of not over 15 per cent. No sample approached even the pharmacopœial maximum and ten contained over 50 per cent. ash. The ash consisted chiefly of calcium sulphate. Another sample, taken on the request of a large wholesaler and guaranteed to contain 61.3 per cent. soluble resin and 16.675 per cent. ash, contained 61.84 per cent. soluble resin and 17.18 per cent. ash, showing that a high-grade powdered asafetida is by no means an impossibility, as often claimed.

THE TREATMENT OF HUMAN CANCER WITH INTRAVENOUS INJECTIONS OF COLLOIDAL COPPER.[1]

By Leo Loeb, C. B. McClurg, and W. O. Sweek, of St. Louis.[2]

The experimental study of tumor growth which, as far as its methodical and continued evolution is concerned, originated about twelve years ago, made possible a systematic analysis of the conditions on which the life and growth of the tumor cells depend, and thus laid the foundation for rational investigation aiming at the cure for cancer. Within the last decade many investigators studied the conditions under which an active and passive immunity against tumor growth can be established in the animal body, and the effect of Roentgen rays and of radium on tumor growth. One of us undertook, in 1901 and 1902, the first experiments in which the effect of various chemicals *in vitro* on the vitality of tumor cells was analyzed.[3] He found that it is possible to obtain, by grading the strength of such a substance as KCN, a gradual decrease in the virulence of tumor cells. The recent work of v. Wassermann and his collaborators marks a most important step in advance in the treatment of carcinoma in mice. They found that a combination of selenium and eosin, after repeated intravenous injections, caused a rapid retrogression of the tumor. The effective dose was very near the lethal dose of the substance. Neuberg, Caspari and Loehe observed that various solutions of heavy metals caused a disappearance of some animal tumors; but they do not state explicitly what kind of substances they used; and although v. Wassermann emphasizes the labile nature of the combination he employed, he does not describe his preparation.[4] In our first experiments we tested the effect of various copper preparations on mouse carcinoma.[5] The mouse carcinoma, which we use in our laboratory, is a very rapidly growing tumor, and it occurred to us that human cancer, which in most cases grows much more slowly than our mouse cancer, might be a much more favorable object for testing the efficiency of various substances. We established the lethal dose of our preparation in various species of animals, and then undertook to employ the substance in cases of human cancer.

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[1] From the Barnard (Free) Skin and Cancer Hospital, St. Louis, Mo.

[2] Reprinted from *Interstate Medical Journal*, vol. xix, No. 12.

[3] Leo Loeb (*Virchow's Archiv*. Bd. 172, 1903).

The first preliminary experiments on human cancer were carried out during May, 1912, with the assistance of Dr. Carroll Smith. During last October and November this work was taken up on a larger scale, and we now wish to report on our result in these later investigations.[6]

We used a colloidal solution of copper prepared according to Bredig's method.[6] Each patient received daily an intravenous injection of the solution, an average of 300 to 400 c.cm. of the solution, warmed to about body temperature, being slowly introduced. Usually six, sometimes seven, injections were given each week.

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[4] Caspari and Neuberg (*Deutsch. med. Wochenschr.*, Vol. 38, p. 375, 1912). Neuberg, Caspari and Loehe (*Berl. klin. Wochenschr.*, July 22nd, 1912).

In their first article Caspari and Neuberg refer to a notice in the daily press, according to which Gaube du Gers, in Paris, treated some cases of cancer successfully with heavy metals. After we had begun our work on human cancer we saw in the *Journal of the American Medical Association*, p. 1773, June 8th, 1912, in reply to an inquiry, a statement that Gaube du Gers, in Paris, had used colloidal copper in the treatment of cancer, but that the references to the treatment appeared only in the daily press, and that no scientific account was available. We have been unable to find out what method was used by du Gers, and what his results were. Recently our attention was called, by Dr. W. E. Leighton, to a note by Drs. M. Laurent and J. Bohec in the *Medical Press and Circular*, October 30th, 1912, in which they state that they gave several intravenous and intramuscular injections of colloid selenium in a case of cancer of the stomach. They state that the pain the patient suffered was diminished, and that his general condition improved.

[5] These investigations are being conducted in conjunction with Dr. M. S. Fleisher and Dr. W. E. Leighton and will be described at a later date.

[6] During my absence from St. Louis last summer Dr. M. S. Fleisher continued, at my request, these preliminary tests.

Professor E. H. Keiser, of St. Louis, assisted us very kindly in the preparation of various substances which were used. To my colleagues at the Barnard (Free) Skin and Cancer Hospital, especially to Dr. N. B. Carson and to Dr. M. F. Engman, I am much indebted for the interest they are taking in the progress of the work. [Leo Loeb.]

The injection is invariably followed by a rise of temperature, which varies usually between 100° and 102° F. Within six hours the temperature again returns to the normal level. The rise of temperature is frequently inaugurated and sometimes followed by a more or less severe chill. By diminishing somewhat the quantity of fluid injected, the chill can frequently be avoided. The reaction becomes less after a certain number of injections have been given. Simultaneously, with a rising temperature, the pulse-rate is usually increased. In certain patients who had a tendency to irregular heart action before the treatment was begun this irregularity may be accentuated a few hours after the injection. Otherwise, no notable changes, so far, have been observed after the injection.

On the whole, patients tolerate these injections very well, and their general condition (appetite, strength, complexion) improves. The number of erythrocytes does not decrease, but, on the contrary, probably shows a definite increase.

Effects on the Tumor.—About two to four hours after an injection, hyperemia is noticeable in the tissue adjoining the tumor. If the tumor is open, this hyperemia is accompanied and followed by an increased secretion from the ulcerated part of the tumor. The hyperemia recurs after each injection in the beginning of the treatment, and then gradually diminishes, the increase of discharge of fluid usually ceasing three to four days after the first few injections. Accompanying the hyperemia there is present an increased sensitiveness of the tumor. After about fifteen injections the increased hyperemia and sensitiveness disappear, and the discharge becomes much less marked than it was before the beginning of the treatment. There exist, of course, some quantitative variations in the appearance and duration of these symptoms. In the report of the individual cases some of these variations will be referred to. Very noticeable was the diminution in the pain caused by the cancer, and there was no necessity of continuing the use of narcotics. The intravenous injections caused a gradual necrosis and resorption, or sloughing, of the tumor, which usually proceeds not very rapidly but continuously. In some cases a gradual diminution in the degree of retrogression of the tumor was noticeable; but so far the retrogression has been continuous, and, at least, two of our cases are very near a complete cure.

We are hopeful that all the cases we are treating will be cured, although we cannot make as yet any definite statement concerning their ultimate fate.

We selected for our treatment, especially, cases in which the changes taking place in the tumor could be followed with the naked eye, but included also a few other cases, upon which we shall report later. All our cases, with one exception, had been operated upon before without success; several had been treated with Roentgen rays, likewise unsuccessfully; in one case the patient had not been operated upon previous to the injection, but had been treated unsuccessfully with Roentgen rays and other means. All the cases were almost hopeless as far as effect of any other surgical or dermatological treatment was concerned.

THE OIL FROM SPURIOUS CUBEBS.[1]

We learn from an article by J. C. Umney and H. V. Potter[2] that a parcel of cubebs imported from Macassar into Amsterdam, and distilled there, yielded an oil which attracted attention by its extraordinarily low optical rotation. Whereas this value ranges normally from —25 to —40°[3], in the oil in question it was only —14°. The cubebs themselves appeared to be in most respects normal, but the odor was mace-like.

The abnormality of this oil led the authors to make some enquiries as to the cubebs present on the London and Amsterdam drug markets, with the unsatisfactory result that out of eight samples examined, only four proved to be genuine cubebs. Three samples consisted of other species of cubebs, while one contained an admixture of other fruits. Part of the samples was also largely adulterated with stalks, in one instance to the extent of 46 p. c. The spurious cubebs differed from the genuine both by their mace-like odor and by the result of the sulphuric acid test. For when the fruit, crushed in a porcelain basin, was moistened with a little concentrated sulphuric acid, the genuine samples quickly showed a beautiful crimson color, while in the case of the false fruits the color was yellowish brown. It is stated that the difference is still more easily perceptible in the ethereal extract of the fruit, of which extract, moreover, the genuine cubebs yield more (20 to 25 p. c.) than does the spurious fruit (only about 15 p. c.). There was also a difference in the microscopical characters of the various species.

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[1] From *Semi-Annual Report* of Schimmel & Co., October, 1912, pp. 50–52.

[2] *Chemist and Druggist*, 80 (1912), 331, 443.

[3] Umney and Potter give —30° as the maximum limit of value. This is probably a misprint.

The authors suspect that the spurious cubebs consist partly of the fruit of Piper ribesoides, Wall. and partly of an as yet unknown variety of Piper. The latter, when subjected to steam distillation,[4] yielded 4 p. c. of essential oil of a decided mace odor: d 0,894, $a_D + 16°$, sap. v. 0, ester v. after acetyl. 56,1. Genuine cubebs, distilled for purposes of comparison, yielded more than twice that percentage of oil with sp. g. 0,917, and opt. rot. —43°.

The behavior under fractionation of the two distillates also showed marked differences. The oil from the spurious cubebs began to boil below 160°; one-half of it passed over up to 200°, and a further 30 p. c. between 200° and 270°. On the other hand, of the oil from the genuine cubebs, only 5 p. c. passed over below 200°, 85 p. c. passing over between 200 and 270°.

The surmise that the false fruits might be identical with those of Piper Lowong, Bl., which were distilled by Peinemann[5] several years ago, proved to be unfounded, the microscopical structure of the two Piper-species being entirely different. Umney and Potter conclude that certain of the abnormal oils of commerce are produced from mixtures of the genuine berries either with this hitherto unidentified, or with other varieties. This would also explain the abnormality of the Amsterdam oil referred to at the beginning of this paragraph.

J. Small[6] and E. M. Holmes[7] also give their views on the same subject. Small has examined several authentic samples of genuine and spurious cubebs, placed at his disposal by the Herbarium and the Museum in London of the Pharmaceutical Society, and, basing himself upon his observations on these, has examined a number of commercial samples.

The articles by Holmes and Small are of purely pharmacognostical interest, and for particulars of their contents we must therefore refer to the originals.

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[4] *Perfum. and Essent. Oil Record*, 3 (1912), 64.

[5] *Arch. der Pharm.*, 234 (1896), 238.

[6] *Pharmaceutical Journ.*, 88 (1912), 639.

[7] *Perfum. and Essent. Oil Record*, 3 (1912), 125.

WILLIAM McINTYRE, 1843–1913

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LIQUOR FERRI IODIDI.

By George M. Beringer, A.M., Ph.M.

The use of the Solution of Iron Iodide for the extemporaneous preparation of the Syrup is undoubtedly increasing. The dispensing doctors and the druggists who are either "too busy" or "too lazy" to make Syrup of Iron Iodide by the official process have willingly relegated to the manufacturer the preparation of the concentrated Solution of Ferrous Iodide, and have thus curtailed their own practice of the art of pharmacy to the simple admixture of such a concentrated solution with Syrup.

As long ago as 1888, this custom was sufficiently in vogue to be recognized by the National Formulary, and, in the first issue of that work in that year, a formula for Liquor Ferri Iodidi was included. The note accompanying that formula stated: "On mixing 1 volume of this Solution of Iodide of Iron with 5 volumes of Syrup, the product will contain about 60 grains of Iodide of Iron (ferrous) in each fluidounce, and will be practically, measure for measure, but not weight for weight, identical with the official Syrup of Iodide of Iron."

It will be thus seen that the extemporaneous preparation of syrup of ferrous iodide in this way had, even at that time, the endorsement of a quasi legal authority.

In the Third Edition of the N. F. published in 1906, the formula has been retained. In the earlier copies of this edition the foot-note stated: "This solution contains about *85* per cent. of Ferrous Iodide. On mixing 1 volume with *15 volumes* of Syrup (U. S. P.), the product will be practically identical with Syrup of Ferrous Iodide (U. S. P.)." Subsequently, this wording was changed, and in the later copies the note reads: "This solution contains about *81* per cent. of Ferrous Iodide. On mixing 1 volume with *11 volumes* of Syrup (U. S. P.), the product will be practically identical with Syrup of Ferrous Iodide (U. S. P.)."

As a matter of fact, both of these statements are incorrect. The N. F. III formula is directed to yield 1000 Cc. of product; if this be changed and the finished product made 1000 Gm. then the solution will contain 81 per cent. of Ferrous Iodide.

The manufacturers have quite generally adopted for the Solution of Ferrous Iodide a strength of sixteen times by volume that of the official Syrup of Iron Iodide. That is, their labels direct that to prepare Syrup Iron Iodide, 1 fluidounce of the Liquor be mixed with 15 fluidounces of Syrup. This is only another evidence that the American physicians, druggists and manufacturers persist in using the apothecaries' measure and think in its terms rather than in the decimal terms of the metric measure. The intent of the National Formulary evidently was to supply a formula for a preparation of the same strength as supplied in the trade.

Several other minor defects in the N. F. formula should be considered. The direction to filter the *boiling solution* of ferrous iodide through paper is a manipulative error that brings trouble. In my experience, hot solutions of ferrous iodide of the strength directed invariably eat right through paper filters, even if of several thicknesses. Either the solution has to be diluted greatly or cooled before filtering through paper or else the hot solution must be filtered through glass wool or asbestos wool, returning the first portion of the filtrate until it comes through clear.

The amount of Hypophosphorous Acid directed to be used in the formula is not the equivalent of that directed as a preservative in the official formula for the Syrup. Consequently, the Solution is prone to undergo change if kept in bottles that are opened frequently, as is apt to be the case. Hence, the Solution should be preserved in small glass stoppered bottles, which should be completely filled and kept tightly stoppered.

The proposition has now been made that the U. S. P. IX should direct that Syrup of Ferrous Iodide be prepared from a concentrated liquor, and, consequently, a formula for a concentrated Solution of Ferrous Iodide will have to be adopted as a new admission in the Pharmacopœia. Our concern is, that the most satisfactory formula be adopted.

The value of Glycerin as a preservative for solutions of iron salts has long been recognized by the practical pharmacists and the manufacturers of the various solutions of ferrous salts. As early as 1857, J. C. Leaming (Proceedings, American Pharmaceutical

Association), proposed the use of Glycerin as a preservative for Solution of Ferrous Iodide, and in the year following, Henry Thayer (AMERICAN JOURNAL OF PHARMACY, 1858, page 390), proposed that the ferrous iodide should be prepared or formed in the presence of Glycerin. At the semi-centennial celebration of the A. Ph. A. in 1902, there was on exhibition a sample of Glycerole of Ferrous Iodide made by Prof. William Procter, Jr., January 15, 1865, and although at that time more than thirty-seven years old, it was in an excellent state of preservation. It is to be remembered that the title Liquor Ferri Iodidi in those early days was applied to an entirely different preparation from what we are now designating under the same title. The solutions of that period were much weaker and were commonly preserved with Glycerin, Honey or Sugar, and these preceded and were displaced by the formula for Syrup of Ferrous Iodide which was subsequently made official. The value of Glycerin as a preservative for ferrous salts, and likewise of iodide solutions, is now fully recognized. Its use is proposed in the pharmacopœial formulas for Diluted Hydriodic Acid and for the Syrup of Hydriodic Acid, and likewise in a number of the N. F. formulas for Elixirs containing iron salts. I have found it of value as a preservative in Iron Iodide Solutions and in the formula submitted herewith, it is used along with Hypophosphorous Acid in proper amount to render the solution permanent. In this concentrated Solution of Iron Iodide the Glycerin serves another useful purpose, namely, it prevents the crystallizing out of the salt, thus assuring solution.

The following formula is submitted for a concentrated Solution of Iron Iodide of such a strength that one volume diluted with fifteen volumes of Syrup will produce a Syrup of Ferrous Iodide practically identical in strength with the Syrup of Ferrous Iodide now official. The strength of 1 in 16 has been retained, because of its present extensive use and likewise to maintain the legal standard of much of the Solution of Iron Iodide that is already in commerce.

LIQUOR FERRI IODIDI.

Solution of Ferrous Iodide.

An aqueous solution containing 107.8 Gm. of Ferrous Iodide ($FeI_2 = 309.69$) in each 100 Cc.

Iron, in the form of fine, bright wire, cut into small pieces	250. Gm.

Iodine	884. Gm.
Hypophosphorous Acid (50 per cent.)	85. Cc.
(If 30 per cent. acid be used) then use	140. Cc.
Glycerin	100. Cc.
Distilled Water, a sufficient quantity	
To make one thousand cubic centimeters.	1000. Cc.

To the Iron, contained in a flat bottom flask, add 1000 Cc. of Distilled Water, then gradually add the Iodine, keeping the temperature down by setting the flask in a vessel of cold water. When the Iodine has all been added, allow the mixture to stand for 12 hours, then heat to boiling until the clear liquid is of a bright green color. Then *cool* the solution and filter through a double filter paper and wash the flask and iron residue with several portions of Distilled Water and pass the washings through the filter. Add the Glycerin to the filtered solution and rapidly evaporate in a porcelain dish on a sand bath to about eight hundred and fifty cubic centimeters. Allow the solution to cool to 90° C., then add the Hypophosphorous Acid, mix thoroughly and when cold add sufficient Distilled Water to make one thousand cubic centimeters.

The finished product should be kept in small glass stoppered bottles entirely filled. It is an emerald green liquid, specific gravity about 1.9 (actual determination of product gave 1.906).

Syrup of Ferrous Iodide made by diluting 1 volume of this liquid with 15 volumes of Syrup (U. S. P.) showed a specific gravity of 1.35, thus practically tallying with the U. S. P. statement for specific gravity of the Syrup of Iron Iodide, and maintaining it of the International Standard of 5 per cent. of Ferrous Iodide.

In the above formula, the Hypophosphorous Acid is advisedly directed to be added to the concentrated Iodide Solution after it has been allowed to cool to 90 ° C. If the Hypophosphorus Acid is added to the Iron Iodide Solution before concentration, it is more or less decomposed. The Pharmacopœia states that Hypophosphorous Acid begins to decompose between 130–140° C. The decomposition appears to commence below this temperature, and in experiments where it was added to the solution before evaporation, the decomposition was quite marked. If the manipulation be changed and the Hypophosphorous Acid added before concentration, then the evaporation must be done on a water-bath.

ON THE METHOD FOR DETERMINING THE LEAD NUMBER OF ASAFETIDA.

By J. R. Rippetoe, P.D.

The "lead number" standard[1] for asafetida and its application as a test, for freedom from, or limit of foreign gum resins, in passing this drug at the ports of entry, New York in particular, has been criticised by several well known chemists (see below) but the method for determining the "lead number" does not seem to have been as closely studied.

In the spring of 1912 I had an occasion to consider this method, the particulars having been given to me by Dr. Seil of the Bureau of Chemistry, who stated at that time that asafetida had a "lead number" of 215 by the method given below, and that they were inclined to reject all importations with a number below 190. The recently published figure for asafetida is 222.[1]

In making some preliminary experiments upon selected tears of asafetida I found the values to vary as much as 66 upon the same sample. These results were called to the attention of the Government Chemists who expressed considerable surprise since they had, up to that time, never found the results to vary to any appreciable extent.

A recent abstract[2] states that the "method has been proposed as being the most accurate test showing both the quality of the gum and possible adulterants."

Five samples were examined by E. J. Parry[3] who found the "lead number" to vary from 144 to 172, and he expressed the belief that there is no authority for assuming that 220 or thereabouts represents even the approximate value of genuine asafetida.

Harrison and Self[4] examined 21 samples and found the values to vary from 18 to 250, and on repeating the determination in several cases they found a variation of 50 where a half strength lead solution was used.

The following results are given in support of my claim that the method is subject to too many variations to be relied upon for determining the "lead number" of either selected tears of asafetida or possible mixtures of asafetida and other gum resins.

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[1] Merril and Seil, 1912 Annual Convention of the Association of Official Agricultural Chemists.

[2] *American Druggist*, Jan., 1913. 17.

[3] *Chem. and Drug.*, 1913, V. 93, p. 180.

[4] *Pharm. Journal*, Feb. 15, 1913, p. 218.

The method was carried out as follows:

The alcoholic solution of the alcohol soluble matter is evaporated upon the water bath, the resin heated with water, stirring, then cooled (adding ice if resin does not separate) and the water decanted. The resin is dissolved in ether, transferred to a separator and washed with water until the water shows no turbidity. The ether solution is filtered into an exaporating dish and the solvent evaporated on the water bath. Weigh roughly about 1.1 gm. of the above resin into a tared beaker and dry for 5 hours at 110° C, cool and weigh. Dissolve in 95 per cent. alcohol and transfer to at 100 c.c. measuring flask or cylinder, care being taken that not more than 70 c.c. of alcohol is used. Add 25 c.c. of a 4 per cent. lead acetate solution, make up to mark with 95 per cent. alcohol, mix thoroughly and set aside over night. Mix thoroughly and filter thru a fluted filter; transfer 25 c.c. of the filtrate to a beaker, add 10 c.c. water and evaporate to 10 c.c. on bath; add 5 c.c. 10 per cent. sulphuric acid, and then 100 c.c. alcohol. Dissolve all separated resin and collect the $PbSO_4$ on a tared Gooch crucible, ignite and weigh.

Run a blank on the lead acetate solution and calculate milligrammes lead absorbed (weight $PbSO_4 \times 0.6830 = Pb$) by 1 gm. of the resin.

The lead acetate solution is prepared by dissolving 4 grammes lead acetate in 20 c.c. of distilled water and sufficient 95 per cent. alcohol to make 100 c.c.

The method as recently announced calls for a 5 per cent. solution of lead acetate and 80 per cent. alcohol to dissolve the resin instead of 95 per cent., otherwise it is essentially the same.

The values preceded by the letter "S" were determined by Mr. Nathan Smith to whom I am also indebted for assistance in preparation of the purified resins, etc.

Lead Number determination experiments were made upon selected samples as follows:

No. 1.—Broken asafetida tears with smooth fracture, yellowish but not pink color, 215.1, S197.3.

No. 2.—Tears yellow surface, fracture smooth, white or pink turning red 221.1, S287.0.

No.3.—Resin from No. 2 heated for 3 to 4 hour periods for

3 days continued to lose weight. Duplicate determinations of lead in the solution 291.5, S306.0.

No. 4.—Tears same as No. 2, the fracture remained white or only turned light pink 203.0, S257.0.

No. 5.—Resin from No. 4 treated same as No. 3, 296.7, S300.6.

No. 6.—Translucent tears, strong asafetida odor 70.9.

No. 7.—Resin from No. 6 treated same as No. 3, 90.2, S89.4.

No. 8.—Ammoniac tears 74.2, S80.5.

No. 9.—Tears yellow surface, fracture smooth, turning red. Four portions of the purified resin were dried and assayed as follows. The figures are duplicate determinations of the lead in the solutions:

Dried 5 hours	at 110°C.	235.3	S231.3
Dried 10 hours	at 110°C.	206.4	S207.0
Dried 20 hours	at 110°C.	221.9	S226.6
Dried 25 hours	at 110°C.	——	S201.0

No. 10.—A quantity of the purified resin used in No. 9 was dissolved in alcohol, 25 c.c. of the solution representing about 1.1 gm. transferred to a tared beaker, the alcohol evaporated and the resin dried for 5 hours at 110° C, and from this, the amount of resin calculated in the solution. The lead number of the resin dried at 110° C was determined and also 2—25 c.c. and 1—15 c.c portions of the solution with the following results:

A	25 Cc. solution		lead number 223.5
B	25 Cc. solution		lead number 232.1
C	15 Cc. solution		lead number 250.7
D	25 Cc. solution	evaporated and dried at 110°	lead number 237.1

No. 11.—About 2½ gms. of the purified resin as used in experiment No. 9 was dried for 5 hours at 110°, cooled and weighed, dissolved in alcohol and made up to 60 c.c. 2—25 c.c. portions were assayed for lead number with the following results,—A 272.7. B 268.1.

No. 12.—A sample of purified asafetida resin prepared by Dr. Seil was examined as follows: Four assays were made. Duplicate determinations of lead in each solution were made, a, b. The crucibles were dried to constant weight at 110° C., cooled and weighed, then ignited over a Meker burner for about 5 minutes, cooled and weighed. Weights are given after drying and after ignition and lead number calculated for each.

Duplicates on blank, assay 2, after drying 0.1662 and 0.1655 gm. $PbSO_4$; after ignition 0.1603 and 0.1600 gm. Duplicate on solution after drying 0.0863 gm. and 0.0866 gm. $PbSO_4$; after ignition 0.0809 and 0.0835 (?) gm.

Duplicates on blank, assay 3, after drying 0.2112 and 0.2111 gm. $PbSO_4$; after ignition 0.2066 and 0.2071 gm.

Assay	Resin in aliquot	Blank $PbSO_4$ Dried 110°	Ignit.	Lead No. $PbSO_4$	Dried 110° Lead No.	Lead No. $PbSO_4$	Ignit. Lead No.
1 a	0.2685	0.1842	0.1782	0.1000	214.2	0.0960	209.1
1 b	0.2685	0.1842	0.1782	0.1004	213.1	0.0952	211.1
2 a	0.2520	0.1658	0.1601	0.0864	215.4	0.0809	214.6
3 a	0.2893	0.2111	0.2068	0.1178	220.2	0.1146	217.7
3 b	0.2893	0.2111	0.2068	0.1188	217.9	0.1151	216.5
4 a	0.2408	0.2111	0.2068	0.1229	250.1	0.1194	247.9
4 b	0.2408	0.2111	0.2068	0.1239	247.3	0.1200	246.2

No. 13.—Asafetida and ammoniac tears. The purified resins of each were prepared separately and dissolved in alcohol to make solutions containing approximately 1.1 gm. in each 25 c.c. The solutions were measured into tared beakers from burettes; the alcohol evaporated upon the water bath and the resin dried in the usual manner.

ASSAYS, 11 TO 15 INCLUSIVE, WERE MADE USING A 5 PER CENT. LEAD ACETATE SOLUTION.

Assay	Resin Asafetida Soln. Cc.	Resin Ammoniac Soln. Cc.	Resin in aliquot	Blank $PbSO_4$ in aliquot dried 110° C.	Ignit.	Resin solution $PbSO_4$ in aliquot dried 110° C.	Ignit.	Lead dried 110°C.	Number ignit.
1	25	—	0.2387	0.1991	0.1961	0.1191	0.1164	228.9	228.0
2	25	—	0.2323	0.1991	0.1961	0.1118	0.1092	256.7	255.5
3	20	—	0.1916	0.1991	0.1961	0.1283	0.1261	252.8	249.5
4	—	25	0.2323	0.1991	0.1961	0.1748	0.1711	71.4	73.5
5	—	25	0.2300	0.1991	0.1961	0.1710	0.1699	83.4	77.8
6	22	3	0.2347	0.1991	0.1961	0.1217	0.1193	225.3	223.5
7	20	5	0.2329	0.1991	0.1961	0.1234	0.1212	222.0	219.6
8	20	5	0.2349	0.1991	0.1961	0.1228	0.1208	221.9	218.9
9	18	6	0.2275	0.1991	0.1961	0.1292	0.1271	209.9	207.2
10	15	10	0.2362	0.1991	0.1961	0.1340	0.1322	188.2	184.7
11	25	—	0.2355	0.2500	0.2476	0.1532	0.1520	280.7	277.3
12	25	—	0.2376	0.2500	0.2476	0.1550	0.1530	273.1	271.9
13	—	25	0.2320	0.2500	0.2476	0.2175	0.2122	95.6	104.2
14	20	5	0.2341	0.2500	0.2476	0.1655	0.1631	246.5	246.5
15	15	10	0.2352	0.2500	0.2476	0.1738	0.1723	221.3	218.7

No. 14.—Solution of asafetida resin from No. 13. Comparison of a 4 per cent. lead acetate solution with a 5 per cent. solution and

95 per cent. with 80 per cent. alcohol for solution of the dried resin. $PbSO_4$ ignited, cooled and weighed.

Assays 6 and 7.—The asafetida soln. was not dried, the resin content being calculated.

Assay	Resin Asafetida Cc.	Resin in aliquot	Lead soln. per cent.	Resin dis. in alcohol per cent.	$PbSO_4$ in aliquot		Lead number
					Blank	Resin Soln.	
1	25	0.2373	4	95	0.1994	0.1112	253.9
2	25	0.2403	5	95	0.2494	0.1524	275.7
3	25	0.2373	5	80	0.2420	0.1832	169.2
4	25	0.2402	5	80	0.2420	0.1852	161.5
5	20	0.1909	5	80	0.2420	0.1877	194.3
6	25	0.2400	5	80	0.2420	0.1879	154.0
7	25	0.2400	5	95	0.2494	0.1566	264.1

The results show that the lead absorption is subject to considerable variation. Several of the factors which seem to have more or less influence are failure to obtain constant weight by drying at 110° C for five hours and the effect of the heat. The strength of the lead acetate solution and the alcohol for dissolving the dried resin are within control.

The use of 80 per cent. alcohol instead of 95 per cent. greatly reduces the absorption and the number obtained upon asafetida tears (see experiment No. 14) is much below the figure 222.

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OBSERVATIONS ON THE KEEPING PROPERTIES OF DIGITALIS AND SOME OF ITS PREPARATIONS.*

By Robert A. Hatcher, M.D., and Cary Eggleston, M.D.

The opinion is prevalent among both physicians and pharmacists that digitalis and its preparations undergo deterioration with considerable rapidity. Certain manufacturers have made much of this belief in the claims put forth regarding the advantages of their specialties, which, of course, are said not to be subject to such deterioration. In addition, however, to these obviously interested claims we find reports of great loss in activity of the leaf coming from men of such reputation as Focke,[1] who found deterioration amounting to 76 per cent. of the original value in two and three-fourths months in a leaf containing about 12 per cent. of moisture. He found a similar loss in one year in a leaf having 6 to 8 per cent. of moisture; leaves with 6.5 per cent. of moisture lost from 14 to 53 per cent. in strength in a year; those having 3 per cent. of moisture lost 15 per cent. in activity in the same period; and there was 5 per cent. loss in a year when the moisture had been reduced to 1.5 per cent., the low point recommended by Focke to ensure the keeping properties of the leaf.

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* From the Laboratory of Pharmacology, Cornell University Medical College, New York City. Read before the New York Branch of the American Pharmaceutical Association, at the New York College of Pharmacy, April 14, 1913.

Houghton and Hamilton [2] report their results in a series of observations upon the loss of potency of different digitalis preparations. An extract of digitalis made by percolation with fairly strong alcohol showed, on tests of eleven samples, an average loss of activity of about 40 per cent. in a period of five years—an annual loss of about 8 per cent. Eight samples of a fluid extract of digitalis, made according to the U. S. P. VII, with a menstruum of 62.5 per cent. alcohol, showed an average loss of 25 per cent. in six years—an annual loss of about 4 per cent. Eleven samples of fluid extract of digitalis made according to the U. S. P. VIII, using 48 per cent. alcohol as the menstruum, showed an average loss of 10 per cent. per year, or a total loss in activity of 35 per cent. in three and one-half years. Lastly, six samples of tincture of digitalis made according to the U. S. P. VIII showed a loss in potency of 27 per cent. in three years—an annual loss of 9 per cent. These results would seem to show that the official alcoholic fluid preparations of digitalis undergo deterioration at a rate ranging from 4 to 10 per cent. per year, varying somewhat in relation to their alcoholic content.

England [3] says of the commercial fluid extract of digitalis, "It is, largely, a concentrated hydro-alcoholic solution of certain proximate principles, or their decomposition products arising from the use of heat." He cites an observation of Roger, giving no reference, however, to the effect that a 5 per cent. maceration of digitalis, when concentrated by 6.6 per cent. (*sic!*) by heat on a water bath, deteriorated to such an extent that it required sixty times as much after concentration as before to yield its toxic dose.

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[1] *Arch. d. Pharm.*, 1903, cxli, 128.

[2] AM. JOUR. PHARM., Oct., 1909.

[3] *Phil. Polyclinic*, Jan., 1897.

Hale [4] cites the observations of others on the question of deterioration, and remarks that it would seem to be fairly well established that the leaves should be dried quickly and carefully, and be properly stored so as not to become moist. Hale thus accepts Focke's views, at least to a certain extent. He does not believe, however, that it is necessary to reduce the moisture in the leaves to as low as 1.5 per cent., as suggested by Focke, and maintained by certain manufacturers who prepare a specialty along these lines. Hale reports that leaves which had been stored for eight years in a paper bag, and which contained 9.1 per cent. of moisture, gave a titre of 750 mg. per kilo of frog by the one hour method. Another sample which had been stored in a cloth bag for three years, and which contained 5.8 per cent. of moisture, required only 500 mg. to kill a kilo frog. A third specimen required 550 mg. per kilo of frog, although it contained 7.8 per cent. of moisture and had been kept in a paper bag for two years. Leaves kept in a cloth bag for a year, and having a moisture content of 9.4 per cent., also gave a frog titre of 500 mg. per kilo. By way of comparison, it may be stated that a fresh specimen of select English leaves, having 7.3 per cent. of moisture, showed 700 mg. per kilo of frog as its titre, thus: three of the old samples showed an activity greater than that of the fresh, high grade, sample of English leaves. The fourth showed an activity about equal to that of the fresh English leaf, though it had been kept in a paper bag for eight years, and in spite of the fact that it contained 9.1 per cent. of moisture.

Hale found that a sample of mouldy leaves showed a deterioration of about 90 per cent. in one year, and he cites Focke as having found that a specimen which gave a valor of 4.36 showed a valor of only 1.6 a year later, having become mouldy in the interim. It would be a useless waste of time to consider these mouldy specimens further, for, of course, they should never be used in any case.

Several observers have contended that heat caused deterioration in digitalis. Some of these are cited by Hale, who then gives some of his own observations which tend to show that temperatures below 120° C. maintained for a moderate length of time do not affect commercial samples of the leaf. This is also borne out by the recommendation of Focke to prepare the leaf for keeping by drying it rapidly with the aid of moderate heat.

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[4] Hygien. Lab. Bull. No. 74, 1911.

Two tinctures of digitalis, made with 70 per cent. alcohol, in Hale's hands showed a frog titre after eight years which was equal to that of the average fresh tincture prepared from a high grade new specimen of English leaf. On the other hand, assays of a number of digitalis preparations obtained in the open market showed a little deterioration in twenty-two months. Three samples of official fluid extract lost 4.3, 6.9, and 8.7 per cent. respectively in this time. Four non-official preparations, obtained at the same time and under like conditions, showed deterioration from 14.3 to 33.3 per cent. in the same interval of time.

Moran[5] records a number of observations, which include some contradictory results, made upon different samples of tinctures of the same age; thus, one showed no deterioration in four years, while another is stated to have appeared "to have deteriorated considerably," in the same time. He also tested a tincture which was twenty-four years old and one made from an extract which was nineteen years old. In the case of both of these he says that the activity was probably due to the saponin present, inferring that they retained no digitalis action at all. In the meagre details that he gives, however, he states that the perfusion of 20.0 c.c. of the twenty-four year old specimen through the heart of a frog caused, "No tonic effect, acceleration of beat; systolic arrest." Of the tincture from the nineteen year old extract only 11.0 c.c. were required to give "No tonic effect; no slowing; systolic arrest." When the tincture which had not deteriorated was used slowing and tonic effect were observed and systolic arrest was caused by 12.0 c.c. It is true that the typical digitalis action on the frog's heart is early slowing with the so-called 'tonic effect,' and systolic arrest is the typical end reaction. However it is not infrequent to see a heart poisoned with digitalis react atypically with no slowing, or even with acceleration, and in any case the stage of slowing is usually soon followed by one of acceleration. It is quite possible that Moran's frogs happened to react atypically, or that the stage of slowing was brief and overlooked, the heart passing into that of acceleration. Clark[6] perfused frog's hearts with digitonin, the saponin body of digitalis, and found that, while it caused "systolic effect," its action was, ". . . produced instantaneously, but is not complete, the auricles and part of the ventricles continuing to beat for some hours." Further, he found that in the concentration of 0.01 mg. per c.c. of Ringer's solution it has no action, while the action described above is produced when the concentration is raised to 0.1 mg. per c.c. of fluid. It is probable that the results reported by Moran were not due to saponin alone, for it is doubtful if this substance is present in the tincture in sufficient concentration to have any effect on the heart such as that described. This is supported by Kiliani,[7] who states that there are but the merest traces of digitonin in digitalis. Certain it is that the end reaction of systolic arrest is a typical digitalis action, and is not what Moran terms a "saponin effect." If we consider, as we are almost compelled to do, that the systolic arrest seen by Moran was due to digitalis action and not to saponin, then his twenty-four year old tincture still possessed 60 per cent. of the activity of his undeteriorated tincture, and the nineteen year old extract showed no deterioration.

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[5] *Medical Chronicle*, No. 55, 1911–1912, p. 1.

[6] *Brit. Med. Jour.*, 1912, II, p. 687.

Moran's own conclusions are to the effect that a tincture should retain its activity for two or three years, but it is difficult to interpret Moran's results.

Goodall,[8] in a note on the keeping properties of the tincture of digitalis concludes that the "tincture of digitalis probably retains its full activity for one year, but that after that period deterioration of its potency to an important extent is likely to take place." His experiments are not given in detail, hence it is impossible to determine the exact value which is to be placed upon his findings, particularly as the information given suggests certain decided defects of technic and control.

Haynes (cited by Goodall without reference) is stated to have found that tincture of digitalis would keep for two years without material change in activity. He kept his specimens in the dark.

We have cited sufficient evidence to show the trend of opinion, and it may be mentioned that the pharmacopeias of several countries, namely, the French, Swiss, and German, require that the supplies of digitalis leaf be renewed annually. The German pharmacopœia has adopted the recommendations of Focke to the effect that the leaf should be dried over calcined lime and kept in small, completely filled glass containers, protected from light and moisture.

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[7] *Arch. der Pharm.*, ccxliii, p. 7.

[8] *Brit. Med. Jour.*, I, 1912, p. 887.

In spite of the general consensus of opinion to the effect that age, moisture, light, and heat, alone or variously combined, according to the observer, cause marked and rapid deterioration in digitalis leaves and alcoholic fluid preparations, we long since came to a contrary opinion, for we had observed that samples of powdered leaf which had been in the laboratory in cardboard containers for several years, and tinctures prepared from these leaves at different times in the past few years, retained their activity almost, if not quite, unimpaired. Stimulated by this apparent anomaly, we undertook an investigation of the question of deterioration of digitalis leaf and some of its preparations.

We began by making new tests of the activity of our own old samples of the leaf and of tinctures made therefrom. Comparing the results of these tests with the records of previous ones, we found that none of the specimens which were four or five years old showed any material deterioration. These samples of leaf and tincture had been kept without any special care, the tinctures being stored in glass-stoppered bottles and exposed to the light and temperature changes of the laboratory. The leaf, as has been mentioned, was kept in the original cardboard containers, and not protected in any way from either heat or moisture changes as these occurred in the atmosphere of the laboratory, but it should be said that the storeroom is unusually dry for this climate. The cat method was employed for the estimation of the activity of the specimens, and in some few instances we also used the one hour frog method with results quite in accord with those obtained with the cat. We sought to obtain some older specimens than ours, and, through the courtesy of E. R. Squibb & Sons, and Gilpin, Langdon & Company, we were supplied with samples of the leaf, ground and unground, tinctures, extracts, and fluid extracts ranging from less than one to more than thirty years old. With some of these we conducted tests on both cats and frogs.

A sample of German digitalis which had been kept in paper for three years on a jobber's shelf was received in the form of No. 60 powder and was found to contain 7.5 per cent. of moisture. It gave a cat unit of 110 mg. per kilo of cat weight. A sample of English leaf in fine powder, which had been kept on a shelf in paper for three years, gave a cat unit of 128 mg., and it contained 6 per cent. of moisture. Both of these were considered by the jobbers as being entirely worthless except as specimens. The fallacy of this view is obvious, for each was found to have an activity about equal to that of the average fresh specimen of good quality. By the cat method the average unit for digitalis, in terms of leaf, is 100 mg. per kilo of cat weight; the range of variation in activity of different fresh specimens of good quality runs from 75 mg., for the most active samples, to 120 mg. for the less active. Since these two showed no deterioration we then examined the oldest specimen of leaf which we had obtained.

This was a sample of about 12 gm. of whole dried leaf which had been kept in a glass-stoppered bottle for not less than twenty-five years. The entire specimen was powdered and passed through a No. 60 sieve. After thorough mixing, 10 gm. of this powder were extracted as follows: The powder was moistened with 4.0 c.c. of dilute alcohol (U. S. P.) and allowed to stand for twenty-four hours in a cylindrical percolator; it was then packed tightly and percolation was started; this was allowed to continue until about 30.0 c.c. were obtained; percolation was then interrupted, maceration continuing until the following day, when percolation was again allowed to proceed until 100.0 c.c. had been obtained.

Three tests by the cat method gave the following units: 74 mg., 95 mg., and 82 mg., an average cat unit of 87 mg. per kilo. Perfectly fresh samples of the most active leaf which we have been able to procure have not shown a lower cat unit than 65 mg. per kilo. This twenty-five year old leaf was, therefore, of very high activity, better even than the average fresh specimen. The leaf was very dry and, although we did not determine its moisture content, we may assume, according to the statements of Focke,[1] that it contained much more than his required minimum of 1.5 per cent., especially as the specimen had not been preserved with any particular care. This specimen, therefore, had almost certainly undergone no deterioration during twenty-five years of standing.

The cat has been said, incorrectly we believe,[9] to be unsuitable for the detection of deterioration owing to the toxic nature of the products of such deterioration, but none of our cats showed atypical effects.

We also examined this specimen by the one hour frog method, and found the fatal dose to lie between 900 and 1000 milligrams per kilo of frog, which is about 25 per cent. higher than the average as determined by Hale, and by Famulener and Lyons.[10]

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[9] AMER. JOUR. PHARM., lxxxv, 1913, p. 99.

It is probable, however, that the results obtained by the cat method are the more nearly correct in this case, for it is well known that frogs vary considerably in susceptibility to the digitalis bodies, such differences have been discussed fully in the article previously cited,[9] and we would refer the reader to that for confirmation of the statement.

Turning to the fluid preparations, we found that a sample of the fluid extract made over ten years ago gave a cat unit of 110 milligrams of leaf per kilo. This specimen was made with 50 per cent. alcohol as the menstruum, and probably showed no deterioration.

A sample of fluid extract of digitalis which was said to be "not less than thirty years old" was then tested on the cat, three tests giving units of 130, 162, and 153 milligrams per kilo respectively, an average cat unit of 148 milligrams, the action being perfectly typical of digitalis. As we have no means of knowing the original activity of the leaf from which this fluid extract was made we might assume that it was of the average strength, that is, that it would originally have shown a unit of about 100 milligrams. On this basis we might suppose that in more than thirty years it had declined only about 40 per cent. in activity. As a matter of fact, it was more active by 32 per cent. than the average of thirteen specimens of fluid extract obtained in commerce in the present year, the explanation being that it is especially difficult to prepare a fluid extract of digitalis which represents the full activity of the leaf.

This thirty-year-old fluid extract having been made according to the Pharmacopœia of 1870, had a menstruum composed of about 70 per cent. alcohol, 20 per cent. glycerin, and 10 per cent. water. Tests of this specimen by the one-hour frog method gave a fatal dose of about 1300 milligrams per kilo of frog. This is almost certainly too high a figure, and may be attributable to the presence of glycerin in the preparation. Glycerin often delays absorption from the lymph-sac of the frog and makes the specimen which contains it seem weaker than it actually is,[9] but this is without influence in the case of tests made on the cat by our method.

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[10] Proc. Am. Pharm. Association, L, 1902, p. 415.

This specimen of fluid extract of digitalis had, therefore, probably undergone no deterioration in thirty years, since, as stated, it was far more active than the average *fluid extract* of digitalis now in use.

England [3] contends that heat, even when moderate and applied for a comparatively short time, causes enormous loss of activity in the fluid preparations of digitalis. Focke controverts this statement by the results of his experience in the concentration by heat on the water bath of aqueous infusions of digitalis when they are too weak to be tested on the frog. He recommends concentration by 50 per cent. and finds that the process causes no reduction in activity. In this country nearly all of those who use the frog method of standardizing digitalis preparations employ heat to reduce the amount of the alcohol before testing such preparations as the tincture.

To these statements with regard to the influence of heat we may add that we found a sample of solid extract of digitalis, which was made in 1908, and which was said to represent two and one-half times the weight of leaf, to have a cat unit of 52 mg. per kilo (that is, 128 mg. of the leaf). There was no obvious loss in activity, although the preparation had been reduced to the consistency of a solid extract by means of evaporation in the presence of heat.

At this point we decided to stop further testing of the dried leaf and of those pharmacopœial preparations of digitalis made with a menstruum containing 50 per cent. or more of alcohol, for it was evident that deterioration does not occur to any considerable degree in such forms of the drug, under ordinary conditions.

It is unnecessary to mention the infusion further than to state that frequent observations confirm the well known fact that it is prone to undergo rapid deterioration even in the presence of a small amount of alcohol, such as is now used.

Deterioration of digitalis in the presence of water is further well illustrated by the following experience: We diluted a tincture of digitalis of known strength with nine parts of normal saline solution and set it aside, closely stoppered, for seventeen days. It was exposed to the light during this time, and for the most part was in an unheated room, though on some days it was exposed to a temperature of 70° F. for as much as five hours at a time. On the seventeenth day after dilution we tested this solution on cats and found a unit of 81.5 mg. of leaf per kilo. (Three tests, 84.6, 71.0 and 89.0 mg. per kilo respectively). On the same day we tested the tincture from which the dilution had been made and found it to have a cat unit of 62.2 mg. of leaf per kilo (two tests, 61.8 and 62.7 mg. respectively). In a period of seventeen days, then, this aqueous dilution of a tincture of digitalis had lost 31 per cent. of its original activity. It is remarkable that it had not lost more than this, and the low temperature of the room may be partly responsible for its comparatively moderate deterioration.

The deterioration of aqueous preparations of digitalis has long been recognized and this fact has recently been recalled by Cushny,[11] who says of strophanthus, squill and digitalis that "Their active principles readily undergo decomposition when the tincture is diluted with water. . . ."

We are disposed to remark that it is irrational to dispense the tincture of digitalis already diluted with water, or with an aqueous vehicle. The physician should order the necessary dilution to be made by the patient each time that he takes the prescribed dose, or should employ a vehicle containing a sufficient amount of alcohol.

There is one other preparation which deserves notice, only to be condemned. This is the acetic fluid extract. A sample of this preparation which was made in 1901 was found to be practically without digitalis action. In order to avoid the disturbing influence of the acetic acid present in the specimen 5.0 c.c. were neutralized with an excess of sodium bicarbonate and evaporated on the water bath to a soft extract. This was treated several times, while still on the water bath, with strong alcohol; the alcoholic extract was decanted and evaporated. It was then taken up with 5.0 c.c. of diluted alcohol, making a clear solution. This was further diluted with normal salt solution to make 50.0 c.c. This solution was then tested on a cat in the usual way. At the end of an hour the animal had received a quantity which represented 1000 mg. of digitalis leaf per kilo. As the animal showed no perceptible effect save slight slowing of the heart (due, in all probability to the fluid injected), it was released. Five hours later it had still shown no positive digitalis effect.

This same preparation—acetic fluid extract—was injected into the ventral lymph sac of each of three frogs. The first weighed 14.5 gm. and received 0.25 c.c. total, the second 21.0 gm. and received 0.5 c.c. total, and the third weighed 21.5 gm. and was injected with 1.0 c.c., an amount equal to about 5000 mg. per kilo of frog. None of the frogs died.

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[11] *Brit. Med. Jour.*, 1912, II, p. 685.

A second sample of acetic fluid extract of digitalis was tested to see if a fresh preparation was active. This sample was made on January 16, 1913, and was tested on the 29th of the same month, only thirteen days after its preparation. It was found to have a cat unit of 925 mg. per kilo, or, roughly, it had only about 10 per cent. of its supposed activity.

From the foregoing it is obvious that this preparation is worthless. This is only what is to be expected, for the decomposition of glucosides by dilute acids is universally recognized.

In addition to these tests of the leaf and galenical preparations we have tested some of the proprietaries with reference to their deterioration. One of these, which has been claimed to be permanent, namely Digalen (liquid), gave the following results:

Two specimens obtained in 1912 were tested at the same time and one gave a cat unit of 1.52 c.c. per kilo, while the other gave a unit of 2.45 c.c. per kilo. A specimen obtained in 1908, and kept sealed as originally sent out, gave a cat unit of approximately 3.0 c.c. per kilo when tested in November, 1912. In the case of the first two specimens, obtained fresh at the same time, the stronger was almost 100 per cent. more active than the weaker. The specimen of 1908 was only about half as active as the one of 1912. It is fair to assume that all of the batches of digalen are originally made of the same activity, and if this assumption be correct this preparation is subject to far more rapid deterioration than either the digitalis leaf or its galenical preparations, which contain 50 per cent. or over of alcohol. The examples cited are but representative of our results with many different specimens of digalen.

It remains for us to discuss briefly some of the opposed findings here recorded.

All whose observations have been cited used frogs exclusively as the test animals in their determinations. Cloetta has contended that fresh digitalis contains little or no digitoxin, but that this constituent is developed during storage. It is known that digitoxin is irregularly and relatively slowly absorbed from the lymph spaces of the frog. If Cloetta's contention is correct the development of digitoxin during keeping would have a tendency to make the drug appear to have undergone deterioration when tested on the frog. On the other hand, such a change would not materially affect the activity of the drug when tested by the cat method, for in this the factor of absorption is entirely eliminated. The statement of Focke that it is in the first few weeks after harvest that digitalis deteriorates most rapidly, and to the greatest extent, exactly coincides with the explanation just offered.

Conclusions.

1. Commercial digitalis leaves of good quality do not undergo any deterioration in many instances as the result of age; in a few cases they do appear to have deteriorated, but only with extreme slowness—at a rate probably not exceeding 1½ to 2 per cent. a year.

2. The same statement holds for the Pharmacopœial preparations made with a menstruum containing at least 50 per cent. of alcohol.

3. Heat below 120° C., applied for a reasonable length of time, does not cause deterioration in digitalis leaves, aqueous infusions, or alcoholic preparations; in the latter case even though the preparation be reduced to a soft solid.

4. The acetic fluid extract of digitalis is worthless.

5. Liquid Digalen is decidedly inferior to the alcohol-containing galenical preparations of digitalis in so far as permanency is concerned.

DIGITALIS. FOXGLOVE.[1]

Common Name: Foxglove, Purple Foxglove.[2]

By John Uri Lloyd, Phar.M.

Digitalis frequents silicious lands, but does not thrive in limestone soil. It is native to, but unequally distributed, over such localities as the Madeira Islands, Portugal, Spain, France, Germany, and especially England. It is widely cultivated, not only for its medicinal properties, but also as a garden flower, being well known under the common term Foxglove, a name ascribed to it both from its resemblance to an ancient musical instrument known as Foxes Glen, and from its fancied resemblance to a gloved finger.

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[1] Part of a treatise on Digitalis in the Lloyd Laboratory Series, published in advance.

[2] The term *Digitalis purpurea* is not precise. The earliest references cite that its flowers range from white to purple, and it is a matter of regret that the name is not characteristic.

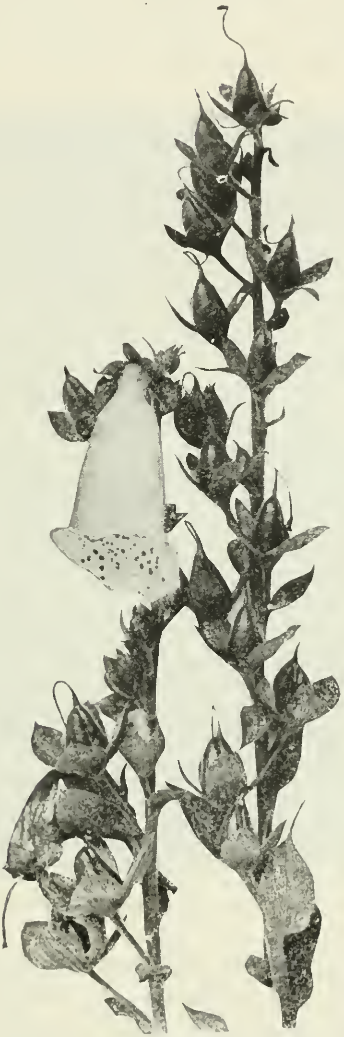

Fig. 1. Flower and fruits of Digitalis.
(Much reduced.)

Tragus was "the first systematic author who noticed it, and from him it received its name, Digitalis (from digitus, finger), in allusion to the German name Fingerhut, signifying a finger-stall, the blossoms resembling the finger of a glove."—*Withering.* (See blossom, Fig. 1.) The home of the most prized Digitalis is England.

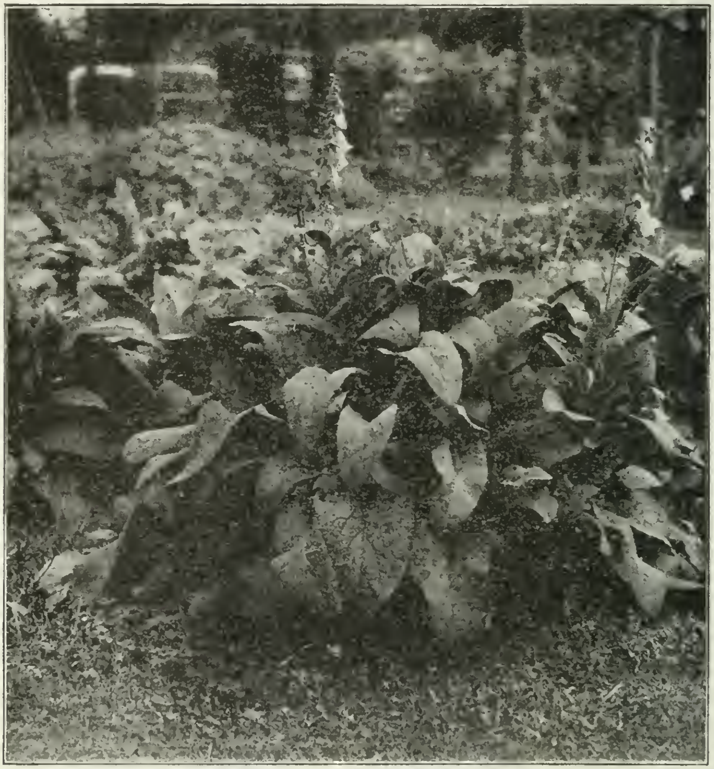

Fig. 2. Digitalis bed in the author's garden, Cincinnati, Ohio. (Much reduced.)

Digitalis is easily grown in lands and countries fitted to its culture, reproducing from self-sown seed. Motherby (1775) states that "it grows only in gravelly beds," a statement that has been carried through subsequent literature, but is not fact, although we accept that the plant "prefers" such soil. In limestone lands Digitalis failed, under our personal observation, to respond satisfactorily to cultivation. Limestone sections of Kentucky, although very fertile otherwise, and producing luxuriant crops of corn and heavy tobacco, failed utterly with Digitalis, although an abundance of seed of unquestioned fertility was employed. In gardens, however, in limestone sections of both Kentucky and Ohio, the transplanted plants thrive for two seasons, but the seeds therefrom fail to maintain the crop. (Fig. 2.) In New York State, in the valley of the Honeoye River, Digitalis planted in 1820 in a flower garden on the homestead of the Webster family (the home of the writer's mother) at the present date (1912) continues as a great wild bed, self-sown from year to year.[3] In some parts of the State of Oregon, Digitalis, escaped from cultivation, has become a thick roadside plant, growing near Cloverdale luxuriantly and in such abundance as to have led to its consideration as a commercial crop. To Dr. Walter F. Brown, of that city, we are indebted for nice specimens of the leaf, and photographs showing the flower-spikes over nine feet high.[4] He writes as follows:

> Replying to your questions I will say:
>
> 1. As near as I can find, Digitalis has been growing here for twenty years. It was confined to a few spots for several years, but it is now found all over the southern half of this county.
>
> 2. It is supposed to have been brought here by pioneers, and cultivated for its flowers.
>
> 3. The dairymen claim that some cows will eat it in early spring, when the leaves are tender and other forage is scarce. It has no noticeable effect on the animals that eat it, but they eat very little of it.
>
> 4. I have used the infusion and the tincture for about fifteen years, and of late years I have used digitalin to some extent.
>
> 5. People in this locality make no use of the plant, but look upon it as a despicable weed that takes their hillside pastures.

Other than the high price of labor in this country, there is no reason why Digitalis should not be American cultivated, and produce in abundance sufficient to supply all our needs, from localities such as Oregon, suited to its growth.

Part Used. The leaf of the second year's growth is generally directed by "authority" to be used, but in our opinion this limitation to the second year's crop is ill-advised and unnecessary. The mature leaves of either the first or the second year's crop (Fig. 3) are superior to immature or overripe leaves of any year. The standard of excellence should be the fully-matured, air-dried leaf, regardless of the age of the plant, and we question if collectors anywhere discriminate concerning the age of the plant. In this connection we would state that, originally, both the root and the leaf of Digitalis were employed in medicine. The root, however, is exceedingly variable in structure, that of the first year's growth being insignificant and sappy, whilst the root of the second year's growth is larger and heavier, and more pronounced in quality. Inasmuch as the leaf possesses fully the qualities of the drug, and is more easily collected, it naturally displaced the root in medicine. Thus the preference once given to the second year's growth of the

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[3] M. I. Wilbert, of Washington, D. C., informs us that under favorable circumstances Digitalis may become a perennial. Possibly this is a factor in its luxuriant growth in the localities mentioned.

[4] We regret much that these photographs were too faint for half-tone reproduction.

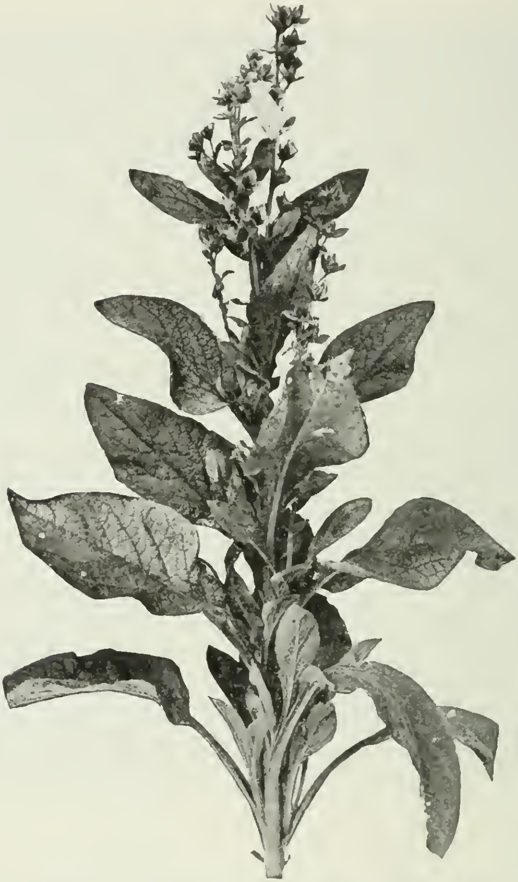

Fig. 3. Prime Digitalis, second year, in flower and seed. (Much reduced.)

root created both the confusion and the prejudice whereby the *leaf of the first year* was finally ostracized, even in authoritative literature. Thus both Pharmacopœias and standard works on materia medica were illogically led to exclude much excellent Digitalis material. In searching for data in this direction, we find that Withering, in 1785, writes as follows:[5]

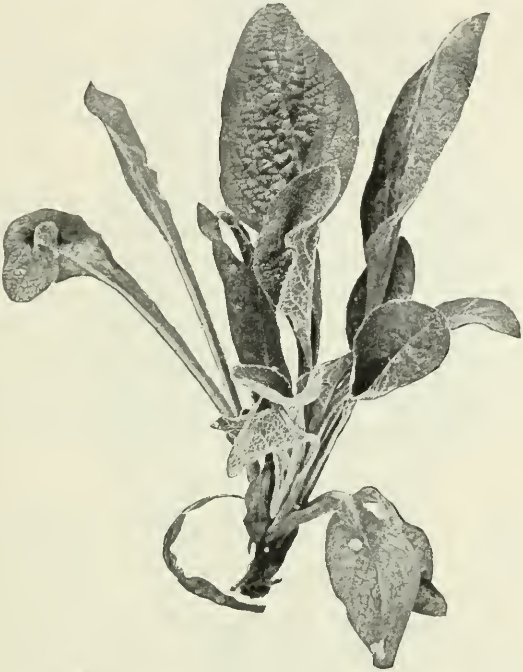

Fig. 4. Matured leaves of Digitalis, first year growth, much reduced.

> My truly valuable and respectable friend, Dr. Ash, informed me that Dr. Cawley, then principal of Brazen Nose College, Oxford, had been cured of a Hydrops Pectoris by an *empirical exhibition of the root* of the Foxglove, after some of the first physicians of the age had declared they could do no more for him. I was now determined to pursue my former ideas more vigorously than before, but was too well aware of the uncertainty which must attend on the exhibition of the *root* of a *biennial* plant, and therefore continued to use the *leaves*.

In connection with the leaf-selection, Withering is also explicit in distinguishing between the qualities of the leaves gathered at *different seasons of the year,* but he does not limit the drug to the second year's growth. Upon the contrary, he states that at different seasons of the year the quality varies greatly, which, we will remark, is true of all herbs. He therefore restricts the leaves employed to those of a *prime quality, gathered when the plant is in flower*,[6] making no other reference whatever to either the first or the second year's crop. We quote as follows:

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[5] From "*An Account of the Foxglove,*" by William Withering, M.D., Physician to the General Hospital at Birmingham, London, 1785.

> "These[7] I had found to vary much as to dose, at different seasons of the year; but I expected, if gathered always in one condition of the plant, viz., when it was in flowering state, and carefully dried, that the dose might be ascertained as exactly as that of any other medicine; nor have I been disappointed in this expectation."

During the past fifteen years the writer has cultivated more or less Digitalis, but has failed to discover any advantage that the second year's crop possesses over the mature leaf of the first year, other than that there is a greater number of mature leaf of the second year, the crop being heavier than the first year. In the original European experimentation the seed and flowers were also employed in therapy, but soon passed into disuse.[8] Withering employed the leaf texture (Fig. 5) after removing the ribs and fibers.

CONSTITUENTS.

So energetic a drug as Digitalis became, naturally, an early prey to the interstructural desecrater and the reckless destroyer of natural substances. To the many products created and evolved, seemingly every conceivable play has been made on the name of the drug. Some of these names have been applied and reapplied to materials so different from each other as to lead to hopeless confusion. Some have been affixed to mixtures of educts, and others to products of manipulation so different, in our opinion, from any natural constituent of Digitalis as to lead one to wonder how the plant would view itself, could it know that its tortured flesh had given rise to such a grotesque litter of abnormal, misnamed creations.

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[6] The second year is the flowering year.—L.

[7] The leaves.—L.

[8] When assayed by the Keller-Fromme method, the radical leaves of Digitalis yield from 0.527 to 0.531 per cent. of digitoxin, the flowers from 0.563 to 0.585 per cent., and the seeds from 0.215 to 0.225 per cent. A. Barenstein (*Pharm. Zeit.*, 1910, 56, 128). Hirohashi (*Jour. pharm soc.*, Japan), on the contrary, concludes as follows: 1. The small upper leaves of the plant are more active than the large middle and lower leaves. 2. The leaves should be gathered before budding sets in. 3. The flowers seem to contain a larger amount of the active principles than the leaves. 4. The flowers retain their activity for a year, red and white being identical. 5. The seeds are physiologically as active as the leaves and flowers. The stems are poorer in active principles.—*Drugg. Cir.*, Feb., 1913.

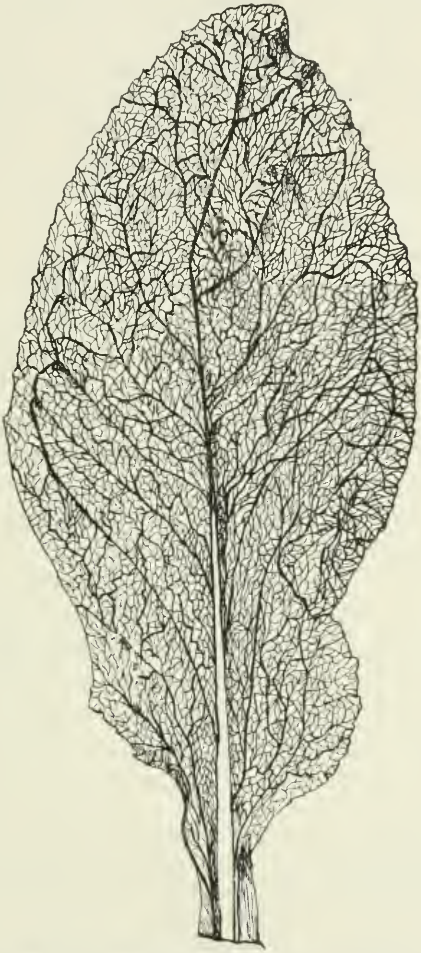

Fig. 5. Digitalis leaf, pen drawing by Miss Eda Van Guelpen, showing texture and ribs. Much reduced.

Up to the eighteenth century nothing of consequence chemically had been applied to the drug. Thompson, in his *London Dispensatory,* 1811, p. 419, alludes to the fact that Destouches established inorganic compounds of calcium and potassium, whilst Radig found potassium acetate.[9] Thompson also made a personal examination, establishing "a deep-green resinous matter, in which its narcotic power resides." Leroyer, of Geneva, afterward gave the names *Digitaline* and *Digitalia*[10] to a material made by a circuitous chemical process, in which it is questionable whether the final product had any place in the original drug. After discussions, Thompson sums it up as "an extractive mixture," adding that "the active principle of Digitalis is unknown."

Came then Walz (1846–1858), Kosmann (1845–1860), Homolle and Quevenne (1845–1861), Nativelle[11] (1872), Schmiedeberg (1874), the last of whom made a most exhaustive research.[12]

From that date to the present, thousands of chemists have sought the secrets of Digitalis, all ignoring the natural combinations of organics and inorganics, all seeking a toxic agent as the desirable therapeutic constituent, and all, so far as we can discover, believing that agent to be *organic* only.[13] Seemingly in it all, natural associations of textural relationship of the organic and inorganic are ignored. First destroy the natural substance of the drug, then from it create anew, is the idealistic process, which needs no other comment than that, after more than one hundred years of these aggressive destructive methods by the most brilliant chemists, the verdict is by many persons accepted, as by Thompson, in 1811, "still unknown."[14]

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[9] The time will come, in our opinion, when such as these will become of great interest. The *inorganic* side of *organic* life is not to be lightly passed over.

[10] The terminations *ine* and *ia* were both once used as alkaloidal affixes. See "The Eclectic Alkaloids," etc., Lloyd Library Bulletin, No. 12.

[11] For this research the Orfila prize of 6,000 francs was awarded, in 1872.

[12] See *Pharm. Journ.,* V, 1875, abstract by Flückiger.

[13] Likewise the cathartic principle of Senna and Rhubarb becomes largely elusive to the destructive chemist. The agricultural chemist has learned the importance of inorganics in plant foods, so in a time to come must chemists in other directions. The study of *textures* embracing the natural inorganic compounds is yet to become a promising field.

[14] From time to time enthusiastic searchers have rested their labors on a supposed triumph that, under the touch of others, has proved elusive. Even now not one but several believe the cry is answered by some Digitalis fragment that will influence the heart of a beast.

Accepting our own inadequacy in the attempt to untangle this knot, and our own dilemma in this labyrinth of threads, we arranged with Professor Dr. H. Kiliani, of Freiburg, Germany, than whom there is perhaps no better living authority on Digitalis, to contribute succinctly to this treatise, under his own name, the present standing of the fairly established Digitalis products and educts. This we now present, believing it to be the latest word on the Digitalis constituents, products, and educts.[15]

CHEMISTRY OF DIGITALIS PURPUREA.

BY PROFESSOR DR. H. KILIANI, FREIBURG, GERMANY.

In a critical study of the more important digitalins of commerce (1874), Schmiedeberg (*Arch. f. experim. Path.*, vol. 3, p. 16) arrived at the conclusion that these preparations were composed mainly of the following principles: *Digitonin, digitoxin, digitalin,* and *digitaleïn*, the first a secondary matter, the three others acting upon the heart, *digitoxin* possessing this property in a most prominent degree. My own researches have extended the knowledge of the chemical nature of these substances.

Digitonin I found easily crystallizable from 85 per cent. alcohol, and it can be extracted by means of this solvent from water-soluble, commercial seeds-digitalin. When crystallized, digitonin is less soluble in water than when amorphous; its solution foams when shaken. It is little soluble in alcohol, insoluble in ether, chloroform, and benzin, and forms an insoluble tannate. The more recent researches yield the formula $C_{54}H_{92}O_{28}$, or $C_{55}H_{94}O_{28}$; warmed with diluted hydrochloric acid, digitonin splits into *digitogenin,* $C_{30}H_{48}O_6$, or $C_{31}H_{50}O_6$,[16] and four molecules of hexose (galactose and dextrose).[17] Digitonin is inert upon the heart, but as a "saponin"—substance acting hæmolytic; this action is annulled by addition of cholesterin (Ranson, *Deutsche mediz. Wochenschr.*, 1901, p. 194), the latter forming the inactive compound *digitonin-cholesterid* (Windaus, *Ber. d. d. chem. Ges.*, vol. 42, p. 238; 1909).—*Schmiedeberg's digitonin* was a *mixture*[18] of the just described substance with another completely amorphous "saponin."

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[15] This contribution was made some months ago. Possibly, were the article now at his command, the author might revise it somewhat.

[16] Ber. d. d. chem. Ges., Vol. 32, p. 2201 (1899).

[17] Ibid. Vol. 24, p. 341 (1891).

[18] Arch. d. Pharm., Vol. 243, p. 5 (1905).

Digitoxin, $C_{34}H_{54}O_{11}$,[19] easily crystallizable, is insoluble in water (when free of other digitalis glucosids or extractive matters); it dissolves freely in alcohol and chloroform, slightly in ether, and is insoluble in petroleum ether (Keller, 1897). Schmiedeberg could not establish the presence of sugar as a constituent of digitoxin; he obtained only the amorphous toxiresin by the action of acids. I resolved digitoxin into crystallized *digitoxigenin*, $C_{22}H_{32}O_4$, and two molecules of easily crystallizable sugar, $C_6H_{12}O_4$, *digitoxose*.[20] *Nativelle's digitalin* and *Arnaud's digitaline cristallisée* are probably identical with digitoxin.

Digitalin (characteristic granules, very little soluble in water, insoluble in ether, chloroform, freely dissolving in alcohol). Schmiedeberg proved this to be a glucosid, but he obtained as product of hydrolysis only a resinous substance (digitali-resin). I established the digitalin to be a uniform substance, $C_{35}H_{56}O_{14}$, notwithstanding its refusal to crystallize, and I resolved the pure "*digitalinum verum*" into well crystallized *digitaligenin*, $C_{22}H_{32}O_3$, or $C_{22}H_{30}O_3$, dextrose and digitalose, $C_7H_{14}O_5$.

Digitaleïn.—At first I had questioned the existence of this substance as an individual body, but later researches proved without doubt that the seeds *and* the leaves contain a considerable quantity of an easily water-soluble substance, vigorously acting upon the heart; yet all endeavors to isolate that very decomposable matter in pure condition have thus far proved fruitless.

Cloëtta's *digalen* (like many another similar digitalis-product) contains certainly a high percentage of digitaleïn, but it is not proved to be a uniform substance, and Cloëtta's claim of having transformed it into *digitoxin* and vice versa, is surely erroneous.

Tests for Digitoxin, Digitalinum verum and Digitonin.—Keller's test for digitoxin: Dissolve the substance in glacial acetic acid containing a little ferric chloride; float this solution upon strong sulphuric acid; at the line of contact appears a dark zone, and after a few minutes the acetic acid liquor becomes dark blue (indicating in this way 1/10 of a milligramme of digitoxin in 1 Cc. of acetic acid). This test is more sure and can also serve for *digitalinum verum*, and (negatively) for *digitonin;* when used in the form proposed by me; 100 Cc. of pure, strong sulphuric acid; and, on the other hand, 100 Cc. of glacial acetic acid are mixed each with 1 Cc. of a solution of 5 g. of ferric sulphate in 100 Cc. of water. Several tenths of a milligramme of the material to be examined are dissolved in 3–4 Cc. of the glacial acetic acid containing ferrum, and beneath this is allowed to flow an equal volume of the aforementioned sulphuric acid: *Digitoxin* acts as in the test of Keller (dark *blue* in the acetic acid), because containing digitoxose; *digitalinum verum*, on the other hand, colors the *sulphuric acid* yellow, afterwards red, and finally *red-violet*, resembling the flower of digitalis. Pure *digitonin*, applied in the same small quantity, causes *no kind of color.*

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[19] Ber. d. d. chem. Ges., Vol. 31, p. 2457 (1898).

[20] For constitution see: Ibid. Vol. 38, p. 4040 (1905).

Keller's method of determining the amount of digitoxin in the leaves, produces, according to experiments of Windaus and the author, doubtful values, the product not being uniform.

The *older literature* contains the description of many substances as *digitalosmin, digitasolin, paradigitaligetin* and others, which were surely amorphous *mixtures.*

MEDICAL HISTORY.

Digitalis has been used in domestic medicine from the earliest date, and has been employed for numerous affections that are more or less connected with heart disturbances. The recording of the titles alone of the works of past authorities in medicine, concerning this drug, would require pages. We shall therefore select a few only of these writings that, for our purpose, are most important.

Rayser (chemist and druggist) is authority for the statement that the term "*Foxes glofe*" occurs in the Saxon Herbarium, 1000 A.D., and again under the name *Cerotheca vulpis,* in a manuscript of the fourteenth century titled *Sinonama Bartholimei.*[21]

Welsh physicians[22] as early as 1233 commended Digitalis in ointment form and in decoction, while both Fuchs (*Fuchsium*)[23] and Tragus,[24] 1552, figured the plant beautifully and gave it much attention, the former introducing the name *Digitalis.* (See page 216.) Boerhaave (*Historical Plants*) considered Digitalis too acrid or poisonous for internal use, whilst Alston, of Edinburgh, says, "Though this herb is not now in use, it is almost of as great efficacy as any drug the Indies produce." The *Catalogue of Plants*, by Caspar Schvvenckfelt, 1600, describes Digitalis as a drug in which the *flowers,* used in decoction as a gargle, subdue fever and inflammation, while the *leaves* relieve bowel troubles.

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[21] *Chemist and Druggist,* London, X Rayser ii.

[22] *Physicians of Myddvai.* The domestic physician of Rhys GRYG, prince of South Wales, who died 1233, made a collection of recipes used in medicine, at that date in his country. He was assisted by his three sons, the collection being a valuable historical record concerning remedial agents and methods of that date. Of this, two compilations have been issued, the two appearing together, 1861, with a translation by John Pughe (470 pp.). The original manuscript is in the British Museum.

Between this period and 1785 the works on domestic medicine, as well as the English dispensatories, gave passing attention to Digitalis, the comments, however, being largely repetitions of each other, and all being copied from earlier publications. The following, from Salmon's *New London Dispensatory,* 1632, may be cited as typical of the then prevailing opinion concerning the ascribed qualities of the remedy:

> *Fox-Glove, Hot and Dry.* It is bitter, cleansing, opening, cutting and attenuating: It expectorates thick flegm, if drunk with Mead, takes away obstructions of the Liver and Spleen, is an extraordinary good wound-herb, prevalent against the King's evil, and may be used instead of Gentian. Two handfuls of the herb taken with Polypody ℥iiij. helps the Epilepsy.—*Salmon's New Dispensatory,* London, 1600.

In 1783 Digitalis was made official in the Edinburgh Pharmacopœia, "in consequence of the recommendation of Dr. Hope," although Rayser (*Chemist and Druggist,* 1910), states that it had received Pharmacopœial recognition elsewhere as early as 1650. Concerning the 1783 Pharmacopœia, Withering says:

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[23] Leonhard Fuchs was a Bavarian, born in Membdingen, 1501. In 1524 he graduated in medicine, became involved in religious controversies by reason of becoming a Protestant, was made Professor of Medicine in Tübingen, 1535, and died in 1566. The Lloyd Library contains his publications, as follows: De Stirpium, in the following editions:

1545, Latin edition.
1549, French edition.
1551, Latin edition.
1558, French edition.
1673, French edition.

[24] Hieronymus Bock, known in literature as *Tragus,* was born at Heiderbach, in the Zweibrucken, 1498. Instead of becoming a monk, as was intended, he became a Protestant, then a schoolmaster, and finally a preacher. He practiced medicine and wrote on Botany. The Lloyd Library has his *De Historia Stirpium,* 1552.

> From this, I am satisfied, it will be again very soon rejected, if it should continue to be exhibited in the unrestrained manner in which it has heretofore been used at Edinburgh, and in the enormous doses in which it is now directed in London.

Came, in 1785, the monumental work of 206 pages, by William Withering, M.D.,[25] who, in the following passage, gives to local empiricism the credit of having excited his interest in this remedy:

> In the year 1775, my opinion was asked concerning a family receipt for the cure of the dropsy. I was told that it had long been kept a secret by an old woman in Shropshire, who had sometimes made cures after the more regular practitioners had failed. I was informed, also, that the effects produced were violent vomiting and purging; for the diuretic effects seemed to have been overlooked. This medicine was composed of twenty or more different herbs; but it was not very difficult for one conversant in these subjects, to perceive that the active herb could be no other than the Foxglove.

In the Preface to his book, Withering states his reason for the effort as follows:

> The use of the Foxglove is getting abroad, and it is better the world should derive some instruction, however imperfect, than that the lives of men should be hazarded by its unguarded exhibition, or that a medicine of so much efficacy should be condemned and rejected as dangerous and unmanageable.

This antedated the hypodermic syringe as well as the physiological experimenter, but yet Withering intrudes on animal experimentation, for he introduces a description of the experimental action of Digitalis leaves upon a turkey fed with the drug, concluding as follows:

> At length he refused all nourishment. On the fifth or sixth day the excrements became as white as chalk; afterwards yellow, greenish, and black. On the eighteenth day he died, greatly reduced in flesh, for he now weighed only three pounds.
>
> On opening him we found the heart, the lungs, the liver and gall-bladder

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[25] *An Account of the Foxglove and Some of its Medical Uses,* with Practical Remarks on Dropsy and Other Diseases, by William Withering, M.D., Physician to the General Hospital at Birmingham. Published in London, 1785.

shrunk and dried up; the stomach was quite empty, but not deprived of its villous coat.—*Hist. de l'Academ.*, 1748, p. 84.

In those days of heroic medication it was naturally concluded that a drug that could thus kill a turkey must be a good medicine to cure a human being, a process of reasoning not yet altogether obsolete.

After much discussion with his professional friends, Withering records his opening experiences, as follows:

> In the summer of the year 1776, I ordered a quantity of the leaves to be dried, and as it then became possible to ascertain its doses, it was gradually adopted by the medical practitioners in the circle of my acquaintance.

Having stated that the cases he cites were "proven from my own experience," Withering closes his historical Preface by the admirable and conservative summing up of the whole matter as follows:

> After all, in spite of opinion, prejudice, or error, time will fix the real value upon this discovery, and determine whether I have imposed upon myself and others, or contributed to the benefit of science and mankind.

Between 1776 and 1785 the Digitalis discussion became very pronounced, and even acrimonious. The entire English medical profession became more or less involved, some considering the drug too poisonous to use, but the majority pushing it to the limit, and lauding its therapeutic qualities.

BOOK REVIEWS.

The Qualitative Analysis of Medicinal Preparations. By H. C. Fuller, B.S., Chief Analyst of Institute of Industrial Research, Washington, D. C. First Edition. First Thousand. John Wiley & Sons, N. Y. 12 mo.—vi+132 pages. Cloth $1.50 net.

The almost unlimited possibilities in the matter of composition of medicinal preparations makes it a difficult task to attempt to outline any systematic procedure for the recognition of the hundreds of active principles of drugs, of which a number may be present in the same preparation. Mr. Fuller, the author of the book whose title is given above, has had abundant experience in the line of examination of such preparations to qualify him for the task which he has attempted, but it is to be regretted that the usefulness of the work will be somewhat curtailed by the evident incompleteness and haste with which it has been prepared for publication. There is a mass of valuable material which will prove useful to every analyst who has to meet such problems as this book is intended to aid in solving if he will take the time to thoroughly go over the detailed scheme of separation and key the various starting points of new subdivisions in the text, to agree with the synopsis of the scheme as given on page ix.

It is also a matter of regret that the author did not think it necessary to warn the analyst who follows the scheme, of the unreliability of color reactions (p. 45, etc.), when several alkaloids may be present, nor to mention the fact that tannin is often extracted from acid solutions by petroleum ether and ether in amounts sufficient to obscure color reactions for small amounts of other principles.

The chapter (or section rather, for the book is confusingly run together without chapter or section headings) on resins is very unsatisfactory from the standpoint of an analyst who wants advice regarding their identication and it is hardly the place in a book of this character to quote so extensively from the work of Powers and Rogerson on the subject of jalap resin, for the information given is of no practical use whatever.

The directions for the preparation of the aurochlorides of the solanum bases (p. 57) is scarcely a practical procedure on account of the smallness of the amount of such bases usually found in a medicine. The table of melting points of these aurochlorides, however, belongs here and not on page 76, where it is inserted under the resins, an unrelated subject.

Opposite page 78 is a table which on page 79 is described as giving the color reactions of cocaine and other local anesthetics. Strangely enough, while the reactions of the other local anesthetics are given in detail, cocaine is altogether missing.

The detailed directions for the treatment of some of the classes of preparations are rather disappointing. Under Emulsions on page 88 the advice to "examine the gummy residue on the filter" will hardly bring joy to the heart of the analyst who arrives at this stage of the work. Under Toothwashes, a list of numerous probable ingredients is mentioned, but saccharin, which is frequently used as a combined sweetener and antiseptic, is overlooked and under the Dusting Powders, zinc stearate, a frequent constituent, is also omitted.

On page 78 it would be advisable to suggest the use of the microscope in connection with the examination of this insoluble residue, for many mineral as well as animal and vegetable substances can be positively identified only by this means.

No provision is made at any place in the scheme for the recognition of peroxides or perborates, which would be overlooked if the plan were followed literally and it is surprising that no reference is made to the separation and identification of paraphenylene diamine, frequently found in hair dyes.

Typographically, the book shows the same carelessness or haste in preparation. Subheadings are evidently omitted in the lists of substances on pages 2 to 12, although found in later lists. There is a strange omission of alkaloids from the preliminary lists mentioned above, although they appear in their proper place in the detailed scheme beginning on page 36.

On page 22 " test " is used for "taste " and on page 88 " ether " is used for " aqueous solution." On page 12 "fluorescence " is twice misspelled although correctly spelled on the following page.

The use of the reformed spelling by which the final " e " of alkaloids is omitted is regrettable. There is a lack of uniformity also in this matter, as apomorphine is spelled both with and without the final " e " on pages 52 and 54, and aspidosamine, page 56 (which, by the way, appears neither in the preliminary list nor in the index) carries the final " e."

The system of italicizing all substances which are likely to be commonly met with should have been done uniformly throughout the book and should have been done with greater care. For instance, on page 20 the items picric acid and pyrogallol are italicized while in the same list the substances phenolphthalein, resorcinol and ichthyol, all of which are found with equal or greater frequency, are not so emphasized.

The book is one which will be very useful to such analysts as have had experience in this line of work and it is to be hoped that future editions will find it greatly improved as it is pioneer work along a line which deserves greater attention than it has heretofore had. Dr. Fuller is to be congratulated upon his having taken the initiative and produced a work which will largely replace the obsolete Dragendorff as the hand-book of the analyst of medicines.

C. H. LaWall.

Food Inspection and Analysis. By Albert E. Leach. Third Edition Revised and Enlarged by Andrew L. Winton. New York: John Wiley & Sons. London: Chapman & Hall, Limited. 1913. $7.50.

With the passage of the Food and Drugs Act in 1906 it was necessary that public analyst, health officers, sanitary chemists and food economists should have a work on the standards of purity of food products, with approved methods of analysis. It was fortunate not only for the government but for the manufacturers of food products that already in 1904 the first edition of Leach's work was published.

Without entering into detail as to the contents of this work we may say that it is very complete and true to the title a work on "Food Inspection and Analysis." The present edition has been revised and enlarged and contains new matter equivalent to about 80 pages, not including some 40 pages changed in the last thousand of the second edition, and 12 new cuts, have been added. The size of the work, however, has been increased but 47 pages, some of the earlier matter being replaced by new, thus performing a double service to the reader.

Among the new features are improved general methods and apparatus for the determination of moisture, ash, and arsenic, modern apparatus for the Babcock test, processes for the detection of foreign fat in dairy products, methods for the determination of ammonia and acidity in meat, and of sugars in cereal products, correction of Munson and Walker's sugar table, new methods for vinegar analysis (including glycerine determination), schemes for the separation of food colors, a subchapter on formic acid (recently introduced as a preservative), methods for the analysis of lemon and orange oils, a summary of analyses of authentic samples of vanilla extract, and a complete revision of the final chapter on fruit and vegetable products with new sections on tomato ketchup, dried fruits, preserves (including maraschino cherries), fruit juices, and non-alcoholic carbonated beverages. In the final chapter are included descriptions of recent methods for the determination of tin, vegetable acids, and habit-forming drugs, and for the detection of saponin, also microscopical methods for the detection of spoilage.

The text of the Federal Pure Food Law, as amended during the present year, and of the Meat Inspection Law, are added for ready reference as an Appendix.

The substantial work of T. B. Osborne in the subchapter on proteins and of W. D. Bigelow in the chapter on meats, both introduced in the second edition, appear unchanged in the present edition.

The author has been fortunate in having associated with him Dr. Kate Barber Winton, whose services in the revision are acknowledged by the author. This new edition of "Leach-Winton," as it will probably come to be known, will be found indispensable to analysts.

THE PLANT ALKALOIDS. By Thomas A. Henry, Superintendent of Laboratories, Scientific and Technical Department, Imperial Institute. Philadelphia: P. Blakiston's Son & Co. 1913. $5.00 net.

All accurate studies upon the active principles of medicinal plants are of interest to pharmacists. The last word, as to the proper menstruum to be used in the manufacture of medicinal preparations and the proper method of procedure to be followed, will not have been said until the important constituents have been isolated and experimented with both chemically and physiologically.

Several good books have already been published upon the plant alkaloids. In Dr. Henry's book we find that he has pretty well digested the original communications upon the study of alkaloidal drugs in both England and the United States as shown by the references to the original literature. This has, however, not been done at the expense of the work of continental investigators, whose researches receive their share of attention. The assay methods are also included and very many reactions for the detection of alkaloids are also given. The physiological action of many of the principles is given, no doubt, because of the interest at the present time in biological assays.

ALLEN'S COMMERCIAL ORGANIC ANALYSIS. Vol. VII. Vegetable Alkaloids, Glucosides, Non-Glucosidal Bitter Principles, Animal Bases, Animal Acids, Lactic Acid, Cyanogen and its Derivatives. Edited by W. A. Davis and Samuel S. Sadtler. Philadelphia: P. Blakiston's Son & Co. 1913. $5.00 net.

The new edition of Allen's Organic Analysis which has been entirely rewritten is a veritable mine of information for pharmacists. While of course these volumes primarily appeal to chemists and manufacturing pharmacists, yet they contain just the information that the retail pharmacist very often is in need of. As with the preceding volumes so in the present volumes there are a number of eminent contributors. Dr. G. Barger, of London, has written the monographs upon "Vegetable Alkaloids" and "Ptomaines or Putrefaction Bases"; Dr. E. Frankland Armstrong, of Reading, England, contributes the chapter on "Glucosides"; Mr. G. C. Jones, of London, is the responsible editor for the article on "Non-Glucosidal Bitter Principles"; Dr. A. E. Taylor, of Philadelphia, has written the monograph on "Animal Bases"; Dr. J. A. Mandel, of New York City, is the author of the article on "Animal Acids"; Mr. Davis, of Harpenden, England, has written the monograph upon "Lactic Acid"; and the final chapter upon "Cyanogen and its Derivatives" represents the work of Mr. Herbert Philipp, Perth Amboy, New Jersey.

The text is illustrated with drawings of several of the substances occurring in a crystalline condition. This portion of the work might well be extended although it is likely that chemists usually pay very little attention to the forms of crystals of pure substances. The references to the literature of original articles is quite extended and for all practical purposes will be found to be sufficient. Some of the articles are very complete and likely to be of very great service at the present time. The article on " lecithins," and in fact the whole chapter on "animal bases" has been presented particularly well. Owing to the interest in lactic acid and its derivatives this chapter also is likely to be frequently consulted and the information applied practically.

CHLORIDE OF LIME IN SANITATION. By Albert H. Hooker. New York: John Wiley & Sons, 1913.

As has been already pointed out in this JOURNAL (1905, vol. 77, pp. 265-281; 1906, vol. 78, pp. 140-144) emergency methods for the purification of drinking water, as (when contamination is beyond control), are very much needed. Such methods are likely to be of a more or less chemical nature. Chlorine has lately been largely advocated and is quite extensively used. The present book contains a vast amount of information on the use of chloride of lime in sanitation. There are also more than 400 abstracts of important articles with references to the original literature.

WILLIAM McINTYRE, Ph.G.; Ph.M.[1]

William McIntyre was born in 1843 in the North of Ireland. He was brought to this country by his parents when he was a small boy. His family settled in the district of Kensington, the north-eastern section of Philadelphia. Here he lived with the family and attended the public schools, passing the various grades and entering the High School which he attended faithfully for three years. At the end of this time he entered the pharmacy of John Bley to begin his career as a pharmacist. Mr. Bley had a system of testing the honesty of the boys he took into his store, but it did not take him long to find out that William McIntyre was above and beyond any temptation to do a dishonest act.

In 1861 he matriculated in the Philadelphia College of Pharmacy. This was during the Civil War and with a desire to serve his country, he enlisted in a Pennsylvania Regiment, but, being a minor, he was prevented from carrying out his patriotic intentions by the opposition of his father, who thought that he was entirely too young. He graduated from the College in 1863. The class at that time was very small, consisting of only twenty-two members. After his graduation, he entered business on his own account on Frankford Avenue. He was filled with the ideals of the professors at the College—Procter, Bridges, Parrish, and Maisch—and he carried out their principles in his daily work. Nothing that would cater to vice and immorality could be purchased in his store.

He inherited in large measure the character and virility which distinguished the sterling Scotch-Irish people who have given so many able men and women to the world.

In 1867 he joined the American Pharmaceutical Association which met in New York City that year; he was a life member of this Organization and contributed many valuable papers and reports. In 1881 he joined the Pennsylvania Pharmaceutical Association and soon became well-known and greatly appreciated by all of its members and in 1893 he was elected president of this body. He was also a member of the Philadelphia College of Pharmacy and became one of the Board of Trustees. In the pharmaceutical meetings of the College he took an active part and was its Secretary for many years. The reports of the meetings were extensively published not only in this country but abroad.

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[1] Read at Annual Meeting of Philadelphia College of Pharmacy, March 31, 1913.

In 1906 he helped to organize the Philadelphia Branch of the American Pharmaceutical Association and became its president in 1908. He was elected treasurer of this body and continued to hold this position until the time of his death. The Philadelphia Association of Retail Druggists was organized in 1899 with Mr. McIntyre as president. He held this office until 1901.

Notwithstanding his busy life as a pharmacist, he took a great interest in children and their education and in 1876 he was elected a school director, devoting a large part of his time to improving conditions and advancing the interest and comfort of both teachers and scholars. Both came to him with their troubles, sure of sympathetic advice and counsel. He entered into minute details to further serve them and when a window was broken, a gate out of order, or a furnace leaking coal-gas, he saw to it that repairs were made without delay. Such devotion extending over a long period of years brought recognition and he became a member of the Board of Education, being reappointed as his term expired, the last being for the long term under the new law governing schools in Philadelphia.

Thirty-seven of his years were given to pharmacy, and when he retired from business, while giving the greater part of his interest to the Board of Education, he retained his love and interest in Pharmacy. After retiring from business he removed from Kensington to his late home at 2434 N. 32nd Street. He was president of the Kensington Electric Company, for years assisted in the organization of the Frankford Avenue Business Men's Association, and took an interest in many other charitable and fraternal organizations.

William McIntyre believed thoroughly in the principle "Mens sana in corpore sano." "Mac," as he was lovingly called by his friends, was always willing to join in athletic exercises and he was often found with the younger men ready for almost any physical exercise which they proposed. He enjoyed swimming, bicycling, and walking and in the pathetic incidents of his last walk when his strength gave out and he was forced to stop by the wayside, the true fiber of the man was revealed in his thoughtful words to those who came to his assistance, when he asked them not to tell his wife in order that she might be spared from the shock.

William McIntyre passed away beloved by all. His life is one continuous reminder to those of us who remain to make the best of our abilities with the keynote ringing through life by giving the best service possible to others ungrudgingly and springing from no other motive but love.

Edwin M. Boring,
Joseph P. Remington,
William L. Cliffe.

PHILADELPHIA COLLEGE OF PHARMACY,

Annual Meeting.

The Annual Meeting of the Philadelphia College of Pharmacy was held March 31st, 1913, at 4 P.M., in the Library. Twenty-two members were present. The minutes of the quarterly meeting, held December 30th, 1912, were read and approved. The minutes of the Board of Trustees for December, 1912, January and February, 1913, were read by the Registrar, J. S. Beetem, and approved.

The annual meeting is the time when the President and the other Officers and Committees submit annual reports. Abstracts from these reports are as follows:

President's Report: The College buildings are in good condition, various repairs having been made during the year, among which may be mentioned that carbon lamps have been replaced by Tungsten lamps. A number of improvements were made in the Pharmaceutical Laboratory giving increased facilities for class and individual instruction. Several analytical balances were placed in this laboratory for the estimations of alcohol in galenical preparations, and other operations requiring accurate weighing.

The total number of students in attendance at the present time is 420, a large number from the different classes are either taking special courses or are doing special work in connection with their theses.

In the analytical chemistry course and microscopical course a large number of the students are doing special work.

A number of inquiries have been received for the names of graduates who could be recommended to fill special positions where a thorough training in chemistry was a requisite requirement. And with the continued enactment of laws for the protection of our citizens the demand for graduates in pharmacy, who are familiar with pure food and drug requirements, will largely increase.

The hot house and roof garden continues to demonstrate its usefulness in making it possible to conduct numerous experiments with most beneficial results.

During the year four active and three associate members were elected. Six active members have died, viz., Clemmons R. Parrish, Henry Mueller, M.D., Miss Florence Yaple, Alexander H. Jones, William McIntyre, and Horace W. Estlack.

Obituary reports of some of the above have been published in the AMERICAN JOURNAL OF PHARMACY, and of the others memoirs will be presented at the June meeting.

Committee on Pharmaceutical Meetings: Since the last Annual Meeting Pharmaceutical Meetings were held in April and May. At the meeting in May a recorder was elected as provided by the by-laws. There has been a growing lack of interest in these meetings by the retail pharmacist notwithstanding the efforts put forth to make attractive programs. A special meeting of the committee was called to consider the advisability of discontinuing the meetings. The committee decided to suspend the meetings till the beginning of the new year, as it is strongly believed that interest in the meetings will sooner or later be revived, but it is very necessary if this is to be accomplished to have an active recorder who can attend to the meetings and prepare suitable programs.

Publication Committee: The AMERICAN JOURNAL OF PHARMACY has been published regularly during the year. All bills for the year have been paid. The unusual balance is mainly due to increased sale of back numbers, which indicates a healthy interest in the Journal. An inventory was taken during the year of all of the volumes of the American Journal of Pharmacy in stock. During the past year there has been received by gifts from Adam Pfromm & Co. some 50 volumes of the Journal, the oldest being 1848.

Editor's Report: During the past year there has been published 570 pages—exclusive of an 11-page index—making an average of 47½ pages to an issue. This matter included 65 original and selected papers covering a wide range of subjects relating to pharmacy

As the editor of a pharmaceutical publication naturally the articles which have to do with the manufacture of pharmaceutical preparations appeal to him as being of paramount importance. During the past year we were fortunate in having from our own members a number of articles which reflect credit upon the College and Journal, of these the following articles may be mentioned: A

Note on Tinct. Cardamoni Compositæ, by John K. Thum; Lime Water, by Herbert J. Watson; Liquor Sodii Phosphatis Comp., by Mitchell Berstein; Notes on Elixir Ferri Quiniæ et Strychniæ Phosphatis, and an improved formula, by W. L. Cliffe; Kieselguhr, by Henry C. Blair; Rhubarb as a Source of Color in place of Golden Seal, by John K. Thum; and the articles by George M. Beringer on Purified Charcoal, and on Cudbear as a pharmaceutical coloring. In looking over the remaining papers it is also interesting to note that very many of them are contributions from either members of our College or graduates of the same.

Curator's Report: The collection in the museum are growing, especially the specimens of historical interest.

Additional shelf room is needed for their accommodation and display. The museum needs, also, the systematic work of some one who is able to give his entire time to the work and build up the collections. The museum contains a wide range of rare and valuable drugs, and it should be kept up to date, and open all the time, so as to be available for consultation and study every day.

Librarian's Report: Not many books have been added to the Library by purchase during the year. The donations were 116 volumes. A total of 4863 books are now ready to be catalogued. A number of periodicals and theses were bound. We receive through the government the Census Reports, Treasury Reports, Reports of the Library of Congress, Smithsonian Institution, Public Health, and Commission of Labor Reports, Daily Consular Trade Reports, and Bulletins and Circulars of the Department of Agriculture. A number of American, English, and German Journals are subscribed for, and a number are received through the exchange list of the AMERICAN JOURNAL OF PHARMACY and the *College Bulletin*. The Library has been used by 873 persons during the year.

Mr. E. M. Boring, for the committee appointed to draft resolutions and prepare a memoir of our late fellow member, William McIntyre, submitted their report, which was on motion referred to the Publication Committee, for insertion in the AMERICAN JOURNAL OF PHARMACY (see p. 234).

Committee on Necrology reported they had received a memoir of the late Charles S. Braddock, of Haddonfield, N. J. And also of the late Alexander H. Jones, which were on motion also referred to the Publication Committee.

A letter was received from Doctor T. F. Hanausek, of Wien, acknowledging the receipt of his notice of election to honorary membership.

Donations were received from Mr. William A. Keeney of a card containing the labels of some of the older druggists of the city, dating back as far as 1846. Also a bill containing items of drugs made out by Thomas Penn in 1740. And from William M. Morrison, several horn cups for syrup bottles, believed to be about 75 years old. The thanks of the College were tendered the donors.

The President made the following appointments:

Committee on By-Laws: George M. Beringer, Joseph W. England, C. A. Weidemann.

Delegates to Pennsylvania Pharmaceutical Association: C. B. Lowe, Joseph P. Remington, F. P. Stroup, O. W. Osterlund, Henry C. Blair, William E. Lee, E. M. Boring, Charles H. LaWall, James C. Perry, W. A. Rumsey.

Delegates to New Jersey Pharmaceutical Association: George M. Beringer, Henry Kraemer, C. B. Lowe, H. L. Stiles, H. P. Thorn.

The Committee on Legislation, to fill vacancy, Richard H. Lackey.

Annual Election: Messrs. W. A. Rumsey and Mitchell Bernstein were appointed tellers.

The Secretary, was, on motion, directed to cast an affirmative ballot for those offices where there was no contest. After a ballot was taken the tellers reported the result of the election, when the chair announced that the following were elected:

President, Howard B. French; 1st Vice-President, R. V. Mattison, M.D.; 2nd Vice-President, Joseph L. Lemberger; Treasurer, Richard M. Shoemaker; Corresponding Secretary, A. W. Miller, M.D.; Recording Secretary, C. A. Weidemann, M. D.; Curator, Joseph W. England; Editor, Henry Kraemer, and Librarian, Katharine E. Nagle.

Trustees: S. P. Sadtler, W. L. Cliffe, and H. K. Mulford.

Publication Committee: Samuel P. Sadtler, Henry Kraemer, Joseph W. England, Joseph P. Remington, Martin I. Wilbert, Charles H. LaWall, and John K. Thum.

Committee of Pharmaceutical Meetings: Henry Kraemer, Joseph P. Remington, C. B. Lowe, M.D., George B. Weidemann, and E. M. Boring.

C. A. Weidemann, M.D.,
Recording Secretary.

ABSTRACT FROM MINUTES OF THE BOARD OF TRUSTEES.

December 3rd, 1912. Eighteen members were present. Professor Moerk present by invitation. Committee on Library reported that a number of additions had been made to the Library by gift and purchase. Seventy-six persons had consulted the Library. Committee on Instruction reported a very important matter relating to educational interests, a general discussion ensued, resulting in the appointment of a Special Committee of Three to draft a suitable letter and resolutions to be reported at a subsequent meeting of the Board. Committee on Finance presented a report which was, on motion, adopted.

December 6th, 1912. Fourteen members were present. Professor Moerk present by invitation. The Special Committee to whom had been referred the educational matters under consideration made their report and same was discussed by Messrs. French, Sadtler, England and Beringer, and finally adopted. Mr. Beringer referred to our method of advertising the College, and moved that the entire matter of advertising be referred to the Committee on Finance and Committee on Announcement; it was so ordered. Professor Remington stated that a friend of the College had presented to the institution four water coolers and would supply the drinking water free of charge and moved that a vote of thanks be tendered the donor; so ordered.

January 7th, 1913. Ten members were present. Committee on Property stated that the present lighting plant was barely able to meet the demand. The Committee had obtained an estimate for installing Tungsten lamps in place of the Carbon ones in use; thereby reducing the required power and producing a more satisfactory light. The committee was authorized to make the change. Committee on Examinations reported that the names of five gentlemen upon whom they recommended that the Honorary degree of Master in Pharmacy be conferred at the next commencement. In accordance with the By-laws, the names were referred to a special committee of three and the Chair appointed R. M. Shoemaker, Howard B. French and C. A. Weidemann.

February 4th, 1913. Eighteen members were present. Committee on Instruction reported that several meetings of the Committee had been held and the subject of changing the course fully discussed, the conclusion being that a change at this time was not desirable. The educational matters that had been under discussion at the December meeting were again considered and freely discussed by Messrs. Beringer, French, Remington, Mattison and England. A sub-committee of three was appointed to consider some features of the subject that had not been decided and to make report at a subsequent meeting. Professor Sadtler on behalf of the Joint Committee to whom had been referred the subject of advertising the College, proposed a plan for consideration. This was discussed by Messrs. Mattison, Lee, Leedom, Beringer and England and on motion adopted. Professor Remington referred to the death of William McIntyre, and moved that a Committee of Three be appointed to take proper action. This was agreed to, and the Chair appointed Messrs. Boring, Cliffe and Remington. Propositions for membership were received from two persons, which on motion, were referred to the Committee on Membership.

February 24th, 1913. Sixteen members were present. The Special Committee to whom was referred the names of five gentlemen recommended for the Honorary degree of Master in Pharmacy, reported in favor of their election. A ballot was taken and they were unanimously elected. Committee on Scholarship had no special report, but a letter was read from Doctor R. V. Mattison relative to the action of the Board in making the Keasby and Mattison Scholarship perpetual. The Special Committee of Three on educational matters presented, for consideration and discussion, additional subjects that would probably require legislative action during the present session. As a matter of interest the Dean announced that Doctor John Uri Lloyd would be in the city the day following, and asked that as many members as possible meet him at the Drug Club. Mr. French read a communication from Dr. W. P. Wilson inviting members of the College or any of the Classes to visit the Commercial Museum. The communication was referred to the Dean to bring to the attention of the students, and if possible arrange for a visit.

PHARMACOGNOSY OF CUBEB.

In the abstract published last month (pp. 193, 194) concerning "The Oil from Spurious Cubebs" a very interesting portion was omitted through lack of space. Mr. J. C. Umney was curious to see why the Amsterdam oil had such an extraordinarily low optical rotation and after having procured some of the Amsterdam cubebs from which the oil was derived submitted them to his assistant, Mr. H. V. Potter. They were subsequently very thoroughly studied by E. M. Holmes, Curator of the Museum Department, Pharmaceutical Society of Great Britain, who found that they were a very mixed lot. In fact he found in the specimens submitted, similar fruits to those which he had already described on May 2, 1885 (*Pharm. Jour.*, 3, xv, p. 909) as being admixed with a lot of genuine cubebs examined by him at that time. These spurious fruits possess a mace-like odor, do *not* give a crimson coloration with sulphuric acid and indeed possess poisonous properties. It was due to the presence of these spurious fruits that the Amsterdam oil, referred to, owed its low optical properties. These spurious fruits were at one time supposed to be derived from *Piper crassipes*. They have since been referred to as a variety, *Rinæ badak*. In all probability they are a distinct species, differing in both odor and structure of the fruit, from any of the *Piper Cubebas*. While classed as a Cubeb by the Java Dutch, they nevertheless recognize it as distinct. The genuine cubebs *Piper Cubeba* var. *Rinæ Katoentjar* and the larger stalked *Piper Cubeba* var. *Rinæ tjaloeroek*, are easily distinguished by the fact that they give a crimson coloration upon the addition of sulphuric acid while the spurious article, *Piper Cubeba* var. *Rinæ badak* does not.

Mr. Holmes has contributed a number of valuable papers during the past 25 years upon the pharmacognosy and commerce of cubebs. A complete summary of his work with that of other investigators (who, in many instances, have been supplied with material by him) is published in the *Pharmaceutical Journal* 88, 1912, p. 604. This work has been very painstaking and ought to interest pharmacists, general wholesale dealers, and brokers in particular. It should be mentioned that there are two other recent articles on cubebs by Mr. Holmes which should be consulted, viz., those published in the *Perfumery and Essential Oil Record*, 3 (1912) p. 64 and 5 (1912) p. 125.

Owing to the confusion among writers of textbooks, as seen by their illustrations of cubeb fruits, Mr. Holmes prevailed upon Mr. J. Small to make a comparative study of different fruits in the herbarium and museum of the Pharmaceutical Society of Great Britain. He then examined a number of commercial samples. Out of five commercial samples, four proved to be heavily adulterated with fruits of *P. C.* var. *Rinæ badak* (*Pharm. Jour.* 88, 1912, p. 639).

OSCAR OLDBERG, 1846–1913.

THE AMERICAN
JOURNAL OF PHARMACY

JUNE, 1913

PEPPER: WHY THE OFFICIAL STANDARDS FOR PERCENTAGE OF NITROGEN IN THE ETHER EXTRACT SHOULD BE MODIFIED OR ABANDONED.

By Charles H. LaWall.

The standards for black pepper as given in Circular No. 19 of the Bureau of Chemistry of the United States Department of Agriculture, provide, among other things, that one hundred parts of the non-volatile ether extract should contain not less than 3.25 parts of nitrogen. Under White Pepper the analogous requirement is "one hundred parts of the non-volatile ether extract contain not less than 4.0 parts of nitrogen."

This requirement, which is intended to be a measure of the piperine in the ether extract, was established through work done and suggestions made by A. L. Winton in 1896,[1] 1897[2] and 1898,[3] at which time Dr. Winton was connected with the Connecticut Agricultural Experiment Station.

According to Dr. Winton's first report upon the subject,[1] he reported a sample of pure black pepper in which the nitrogen in the ether extract was 2.64 per cent. and a sample of a pure white pepper, in which the nitrogen in the ether extract was 3.25 per cent. Subsequent work upon the subject led to the establishment of the present official standards, for the mean of a number of determinations showed a figure of 3.96 per cent. for black pepper and 4.31 per cent, for white pepper in 1897[2] and 3.29 per cent. for black pepper and 4.18 per cent. for white pepper in 1898.[3]

Later work done by Doolittle (Michigan Dairy and Food Commission Bulletin 94) practically bears out Winton's previously suggested standards.

Late in the year 1912 my attention was drawn to the subject by being called upon to make some analyses of white pepper to determine this particular point, the analyst of a firm making large purchases having complained of the fact that the nitrogen in the ether extract was suspiciously low for this substance, being only about 3.25 per cent. Several analyses having verified the fact that low figures were being given by different lots of white pepper, some analyses were made of black pepper with regard to this constant and low results were also obtained, but not proportionately so, only one being below the legal requirement.

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[1] Bulletin 123, Conn. Agric. Exp. Sta., 1896, p. 32.

[2] 21st Ann. Rep. Conn. Agric. Exp. Sta., 1897, p. 18.

[3] 22nd Ann. Rep. Conn. Agric. Exp. Sta., 1898, p. 1894.

As a matter of fact, the requirement is one which is purely arbitrary and possibly subject to seasonal or other natural variation, or to the time of collection of the berry. Analyses made recently of a number of samples of both white and black pepper show ten instances in which the nitrogen percentage ran below the U. S. standard for this factor in white pepper. All other characteristics are normal with the exception of the ash and insoluble ash in No. 1. The black peppers, with one exception, showed a figure for nitrogen content of the ether extract in excess of the minimum requirement.

I have communicated with other analysts who have been examining spices and they report having had similar experiences in some instances. It would seem as though this requirement should either be modified or that some tolerance should be exercised by analysts in the matter of interpretation of results in rejection of samples on non-essential points. As a matter of fact, while piperine does contribute some pungency to both white and black pepper, it is the least valuable of the active constituents present, as all of the aroma and flavor and much of the pungency as well are contributed by the volatile oil and the resinous substances present.

The Analytical Data on the Foregoing Samples are Herewith Given:

White pepper samples	Ash per cent.	Ash insol. in HCl	Non-vol. eth. ext.	N in n. v. e. ext.	Crude fibre	Microscopic appearance
1	3.30	0.65	7.66	3.71	3.25	inferior
2	1.15	0.30	8.14	3.85	2.67	O.K.
3	0.90	0.25	7.93	3.34	1.91	O.K.
4	1.28	0.18	7.63	3.60	3.53	O.K.
5	1.07	0.20	7.80	3.42	1.65	O.K.
6	1.05	0.20	7.88	4.00	3.63	O.K.
7	1.08	0.13	8.02	3.21	1.80	O.K.
8	1.20	0.20	7.41	3.70	3.46	O.K.
9	1.20	0.25	8.65	3.24	2.21	O.K.
10	1.24	0.41	7.72	3.62	2.53	O.K.

THE PHYSIOLOGICAL ACTIVITY OF ACETIC FLUIDEXTRACT OF DIGITALIS.

By W. A. Pearson.

Recently a lot of Acetic Fluidextract of Digitalis (containing about 15 per cent. of acetic acid) was returned to us with the statement that "it was of unsatisfactory physiological activity." From the records I found that the preparation had been made in 1912 from Digitalis Leaves which I had previously tested and found to be of satisfactory physiological activity.

Five c.c. of the acetic fluidextract was diluted to 50 c.c. with physiological salt solution and various amounts of this dilution injected into eight different guinea pigs with the following results:

Pig No. 1, Weight 350 Gm. Injected.—1.0 c.c. of dilution (0.1 c.c. of acetic fluidextract). Result.—No toxic action noted.

Pig No. 2, Weight 268 Gm. Injected.—1.2 c.c. of dilution (0.12 c.c. of acetic fluidextract). Result.—No toxic action noted.

Pig No. 3, Weight 285 Gm. Injected.—1.5 c.c. of dilution (0.15 c.c. of acetic fluidextract). Result.—No toxic action noted.

Pig No. 4, Weight 290 Gm. Injected.—2.0 c.c. of dilution (0.2 c.c. of acetic fluidextract). Result.—No toxic action noted.

Pig No. 5, Weight 350 Gm. Injected.—1.0 c.c. of dilution (0.1 c.c. of acetic fluidextract). Result.—No toxic action noted.

Pig No. 6, Weight 268 Gm. Injected —1.2 c.c. of dilution (0.12 c.c. of acetic fluidextract). Result.—No toxic action noted.

Pig No. 7, Weight 285 Gm. Injected.—1.5 c.c. of dilution (0.15 c.c. of acetic fluidextract). Result.—No toxic action noted.

Pig No. 8, Weight 290 Gm. Injected.—2.0 c.c. of dilution (0.2 c.c. of acetic fluidextract). Result.—No toxic action noted.

0.1 c.c. of a Fluidextract of Digitalis, U. S. P. (1.0 c.c. of the 1–10 dilution) should kill a 250 Gm. guinea pig within two hours after the development of typical symptoms of digitalis poisoning. As there was some question if any acetic fluidextract of Digitalis would be of corresponding physiologic activity two fluidextracts were freshly prepared from the same ground digitalis leaves. One fluidextract was made according to the U. S. P. method, the other with acetic acid. Each of these samples was diluted to ten volumes with physiological salt solution and injected into guinea pigs with the following results:

Pig No. 9, Weight 280 Gm. Injected.—1 c.c. of dilution (0.1 c.c. of Acetic Fluidextract). Result.—No toxic action noted.

Pig No. 10, Weight 309 Gm. Injected.—1.5 c.c. of dilution (0.15 c.c. of Acetic Fluidextract). Result.—No toxic action noted.

Pig No. 11, Weight 233 Gm. Injected.—2 c.c. of dilution (0.2 c.c. of Acetic Fluidextract). Result.—No toxic action noted.

Pig No. 12, Weight 275 Gm. Injected.—1 c.c. of dilution (0.1 c.c. of Fluidextract of Digitalis U. S. P.). Result.—Salivation, but pig did not die.

Pig No. 13, Weight 305 Gm. Injected.—1.5 c.c. of dilution (0.15 c.c. of Fluidextract of Digitalis U. S. P. made from leaves from store). Result.—Convulsions, but pig did not die till next morning.

Pig No. 14, Weight 325 Gm. Injected.—2 c.c. of dilution (0.2 c.c. of U. S. P. Fluidextract of Digitalis). Result.—Severe convulsions. Dead in 30 minutes.

It may be readily seen from the results above that the acetic fluidextract of digitalis was markedly inferior in physiological activity to the U. S. P. product made from the same leaves.

In order to determine if the acetic fluidextract had any physiological activity Calcium Carbonate and Magnesium Carbonate was shaken with a portion of the acetic fluidextract and after most of the effervescence had ceased the liquid was filtered. 1 c.c. of this filtrate was now injected into a guinea pig which weighed 320 Gm. No convulsions were noticed. Even salivation, frequent defecation and urination was not observed. The pig died after two days, but post mortem examination did not show heart in firm systole or blood vessels engorged.

Summary and Conclusion.—The physiological activity of acetic fluidextract of Digitalis is undoubtedly markedly less than the fluidextract made by U. S. P. method. In all probability the glucosides are promptly broken down by the acetic acid that is present.

Laboratories Smith, Kline & French Co., Philadelphia, Pa.

THE JUICE OF THE BLUEBERRY AS AN INDICATOR.

By G. N. Watson.

Undoubtedly all have noticed the greenish-blue color that is imparted to the alkaline tongue and lips by the common blueberry (Vaccinium corymbosum) and its varieties. This fact, together with the fact that the juice is turned to a beautiful rose color by acids suggested that the juice of this berry could be used as an indicator in volumetric analysis.

Employing a few drops of the neutralized juice, I find that the color reaction is very delicate, changing from an olive-green in alkaline solution to the rose color in acid solution. Volumetric solutions, ranging from N/1 to N/50, were tried and the color change was found sensitive to one drop of the latter solution.

The extent of the present investigation seems to indicate that the action is similar to that of Litmus. This is especially true concerning its behavior with carbonates. It is sensitive to carbonic acid and, as in the case of litmus, the solution of carbonate must be boiled.

In common alkaloidal work, the titration of excess N/10 acid by means of N/50 alkali, the new indicator was found to not only equal cochineal in sensitiveness but to have the advantage of a more decided change in color.

Drug Laboratory,
University of Kansas.

THE RATIONAL USE OF DISINFECTANTS AND ALGICIDES IN MUNICIPAL WATER SUPPLIES.[1]

By Karl F. Kellerman, Washington, D. C.

Most cities must secure their water supplies from polluted sources; it is useless to attempt a close imitation of natural processes in purifying this water.

The responsibility for purifying water rests upon the company or municipality which supplies it to the consumers, but there should be authority for preventing unreasonable pollution by one community of the sources of supply of other communities.

Disinfection of a water by chemical agents is desirable as an emergency treatment in case of temporary pollution of a supply; it is desirable as a routine method in case the supply is continuously subjected to dangerous pollution.

Hypochlorite is at present the cheapest as well as the most efficient agent for the disinfection of water.

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[1] Abstract of paper presented before Section VIII on Hygiene, at the Eighth International Congress of Applied Chemistry, Washington and New York, September 4–13, 1912, and reprinted from "Wasser und Abwasser," Band 6, 1913.

Copper sulphate should be used as an emergency treatment for eradicating odor-producing algae.

For the convenience of those who wish to superintend personally the treatment of water for removing algal pollutions, I have prepared tables showing the quantity of copper sulphate required to eradicate the more common forms, and also the concentration beyond which copper sulphate may be dangerous for several kinds of fish.

TABLE I SHOWING QUANTITY OF COPPER SULPHATE REQUIRED TO KILL VARIOUS FORMS OF ODOR-PRODUCING ORGANISMS.

Copper sulphate expressed as parts per million (mg l).

Anabaena	0,09	Kirchneriella	5,00—10
Asterionella	0,10	Leptomitus	0,40
Beggiatoa	5,00	Microspora	0,40
Chara	0,20—5	Navicula	0,07
Cladophora	1,00	Oscillatoria	0,10—0,40
Cladothrix	0,20	Peridinium	2,00
Clathrocystis	0,10	Scenedesmus	5,00—10
Coelosphaerium	0,30	Spirogyra	0,05—0,30
Conferva	0,40—2	Ulothrix	0,20
Crenothrix	0,30	Uroglena	0,50
Euglena	1,00	Volvox	0,25
Fragilaria	0,25	Zygnema	0,70
Hydrodictyon	0,10		

TABLE II SHOWING OCCURRENCE OF TWELVE GENERA OF ALGÆ MOST FREQUENTLY REPORTED AS CAUSING TROUBLE IN RESERVOIRS AND PONDS.

Number of cases.

Anabaena	27	Conferva	56
Asterionella	9	Crenothrix	13
Beggiatoa	20	Fragilaria	19
Chara	25	Navicula	21
Cladophora	17	Oscillatoria	49
Clathrocystis	23	Spirogyra	43

TABLE III SHOWING SAFE LIMIT FOR TREATING WATER WITH COPPER SULPHATE WHEN CERTAIN FISH ARE PRESENT.

Copper sulphate expressed as parts per million (mg l).

Black Bass (Zander)	2,10	Pickerel (Hecht)	0,40
Carp (Karpfen)	0,30	Suckers (Seehase)	0,30
Catfish	0,40	Sunfish (Sonnenfisch)	1,20
Goldfish (Goldfisch)	0,50	Trout (Forelle)	0,14
Perch (Barsch)	0,75		

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3. *Moore,* Geo. T., and *Kellerman,* Karl F., Copper as an algicide and disinfectant in water supplies. Bulletin 76, Bureau of Plant Industry, U. S. Department of Agriculture, 1905.

METHODS FOR THE ANALYSIS OF CASTILE SOAP.[1]

By JOSEPH L. MAYER.

Castile Soap is official and the authorities recognize the pharmacopœia as a standard, therefore care should be exercised to buy or sell an article which is true to name and is an olive oil soap.

Aside from the fact that the sale of a substitute subjects the seller to legal prosecution, its use causes the difficulty so frequently encountered in preparing soap liniment.

As many soaps sold as castile are not what they are labelled it is necessary to subject samples to analysis in order to determine whether they are properly made olive oil soaps.

In my own work I have employed the following methods with excellent results:

Sampling.—Select a sample which is representative of the whole lot or bar. If in the latter form shavings should be taken from different parts such as the outer and inner surfaces, and after being thoroughly mixed kept in a tightly corked bottle from which samples are taken for analysis.

Water.—The method of U. S. P., that is taking .500 gramme of sample, placing in a previously tared beaker containing 1 gramme of sand, adding 10 c.c. alcohol and evaporating to dryness and then drying at 110° C. to constant weight is entirely satisfactory. Care must be exercised in heating to conduct the evaporation on a water bath and to employ a small flame, otherwise the sand will be very forcibly ejected from the beaker and the determination ruined.

The quantity of water allowed by the pharmacopœia—36 per cent.—is excessive, and should be very much reduced in the new edition.

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[1] Read before the Kings County Pharmaceutical Society, May 13, 1913.

Tests for Animal Fats.—The pharmocopœia states that if a four per cent. alcoholic solution of soap be allowed to cool it should not gelatinize, indicating the absence of animal fats. The most satisfactory method of carrying out this test is to place the alcohol and soap in an Erlenmeyer flask and heat on a water bath, employing a reflux condenser to prevent evaporation. When solution is complete the material is allowed to cool to room temperature (not below 20° C.).

This test is not very satisfactory as the pharmacopœia allows 36 per cent. of water, and as most samples do not contain that much it is easy to see that instead of a 4 per cent. solution one may have almost any strength depending upon the quantity of moisture, the result being that the solution gelatinizes and indicates animal fat where none was used.

Therefore the pharmacopœia should provide tests to determine the origin of the fat employed in making the soap, such as determining the iodine number of the fatty acids and their melting points.

Separation of the Fatty Acids.—To a portion of the soap dissolved in water add an excess of diluted sulphuric acid and heat on a water bath until the fatty acids rise to the top a clear layer, then cool in ice water and when the fatty acids are solidified pour off the water. Repeat this heating and cooling process twice, then filter through paper wetted with water; this will retain the fatty acids which after drying are ready for the tests.

Iodine Number of Fatty Acids.—Determine iodine number of fatty acids as directed by the pharmacopœia for fats and oils. The writer employs the Hanus method and as suggested by him (*Drug. Circ.*, 1910, page 106) this should be adopted as the official method due to the keeping qualities of the solution and shorter time required to make the determination. Having determined the iodine number of the fatty acid a reference to Allen's organic analysis will indicate the fat or oil which was employed in the preparation of the soap.

Melting Point of Fatty Acids.—Take some of the fatty acids prepared as above, gently melt them and immerse the bulb of a thermometer in them; in a few seconds they will have congealed and all that remains is to put the thermometer through a cork in an ounce wide mouth bottle and then suspend the bottle and thermometer in a beaker of water and heat the water slowly. The melting point is regarded as the time when the material forms a clear drop on the tip of the thermometer. Allen's organic analysis gives the melting points of various fatty acids.

Tests for Silica and other Insoluble Matter.—The pharmacopœia determines these by dissolving 20 grammes of soap in hot alcohol, washing with hot alcohol, then with hot water and weighing the insoluble as silica. A better plan is to take 5 grammes of soap, dissolve in about 150 c.c. hot water and collect the insoluble on a tared ashless filter paper and after washing with hot water drying at 105° C. and weighing. The increase in weight of the filter paper indicates the insoluble. After igniting this the residue represents insoluble mineral matter.

Sodium Carbonate.—The pharmacopœia dissolves 20 grammes of soap in hot alcohol and pours on a tared filter papei ; the increase in weight of the paper after washing with hot alcohol is regarded as sodium carbonate, silica, etc.; after pouring water on this the residue is silica and other insoluble matter; the difference between the two being regarded as Sodium Carbonate.

Free Alkali.—If upon adding a few drops of alcoholic solution of phenolphtalein to the freshly cut surface of the soap a pink color is not developed the absence of free caustic alkali is indicated.

The pharmacopœial method of determining alkalinity is inexact and indefinite.

The method of determining sodium carbonate as above directed can with slight modification be employed for the quantitative determination of free alkali.

In place of taking 20 grammes take 2 grammes of soap, dissolve in about 150 c.c. of hot neutral alcohol and filter. After washing the filter thoroughly with hot neutral alcohol add phenolphthalein to filtrate and titrate with N/10 H_2SO_4. The Alkalinity found is calculated as free alkali due to sodium hydroxide. The material insoluble in alcohol is then dissolved in water and titrated with N/10 H_2SO_4, using Methyl orange as indicator. This alkalinity is calculated as free alkali due to sodium carbonate.

If the soap contains both free alkali and free fat the heating with alcohol will influence the result, and for that reason it is often advantageous to follow Devines' method of determining free alkali (*Journal American Chem. Soc.*, 1900, page 693), which is carried out as follows:

Weigh 2 grammes of Soap into a 300 c.c. flask, add 50 c.c. of alcohol, an excess of N/10 stearic acid in alcohol, a few drops of phenolphthalein solution: connect with a reflux condenser and place the whole on a water bath for half an hour. The stearic acid should constantly be in excess, indicated by the solution remaining colorless. The excess of Acid is determined by means of N/10 alcoholic KOH, the difference is the amount required to combine with the total free alkali in the 2 grammes of soap taken.

1 c.c. N/10 Acid is the equivalent of .00397 gramme Caustic Soda or .00526 gramme Sodium Carbonate.

Should it be necessary to determine what quantity of the above is free caustic alkali and what quantity is carbonated, Devine's Method provides that a second determination similar to the first be started, and having calculated the total alkali from the first determination as sodium carbonate add barium chloride to precipitate the alkali, heat a few minutes and after adding phenolphthalein titrate with N/10 stearic acid. This figure represents the c.c. required to neutralize the caustic alkali in the soap and the difference between this and the total alkali will correspond to the carbonate.

Refractive Index of Fatty Acids.—The determination of the refractive index of the fatty acid often gives valuable information with reference to the origin of the fat employed in making the soap. This determination is easily made if a refractometer is at hand.

More tests could be applied by the pharmacist to enable him to differentiate genuine and spurious olive oil soaps: The above in addition to being sufficient are simple, accurate and easily performed and should therefore be considered for inclusion in the pharmacopœia.

REGISTRATION OF THE PHILADELPHIA COLLEGE OF PHARMACY IN NEW YORK.

By John Uri Lloyd, Phar. M.

"At a meeting of the board of regents of the University of the State of New York held December 12th, last, the registration of the Philadelphia College of Pharmacy was rescinded. . . . As the matter now stands, a graduate of the Philadelphia College of Pharmacy is not recognized under the laws of New York State as a graduate in pharmacy, but must take an additional year at some 'registered' college before he may appear before the board of pharmacy in this State for examination. . . . While the rescinding of the registration of the Philadelphia College of Pharmacy by the New York regents was consummated as long ago as December, the *Circular* has refrained from saying anything about it, until it could go into the matter thoroughly, and it believes that the article given in its new columns this month will be really news to a large majority of, if not practically all, its readers. That it will be read with a variety of emotions by druggists throughout the country, we cannot doubt; for even if no one else were affected, the thousands of graduates of the Philadelphia college scattered throughout the country—teachers, board members, heads of large manufacturing and wholesale establishments, physicians, leading druggists and citizens, authors and editors—will learn of the situation in which their alma mater finds herself, with sorrow, resentment, misgivings or otherwise, as the matter chances to strike them. Some there will be—indeed we happen to know that some there are—who will long for a return to the good old days of the college when entrance requirements, while perhaps not so high as at present, were really what they seemed, when the diploma was a true label for the graduate, when thoroughness was paramount, and when theatrical show was taboo."—*Druggists' Circular,* Editorial, April, 1913.

The decision of the board of regents of New York, as outlined in the above fragment of an editorial in the long-established *Druggists' Circular* of New York City, together with the detailed article on the subject in the same number of the *Circular*, will strike the majority of the pharmacists of America a stunning blow. Whilst the different Boards of Pharmacy and Medicine have been suppressing many institutions, more or less prominent, regardless of their professional affiliations or ideals, and as a rule, basing their action upon what in the opinion of many, was mere "theatrical show in education" as a standard of excellence, those concerned in the greater institutions have seemingly felt little interest in the matter. As a parallel to this, one may well turn to Æsop, and read the fable of the blacksmith and the lion. Note how the lion submitted to the paring of his claws and the extraction of his teeth, one by one, and then see, in the end, how the great beast, rendered harmless and defenseless, was treated by his adroit antagonist.

Men there are who will say that the examining boards of the different states are not antagonistic to the development of pharmacy, or to the advancement of medicine. There are other men, however, who believe that the ultimate aim of it all is class legislation, that will permit entrance into professional life, only to the sons of the rich, and that will forever prohibit any opportunity, in a professional direction, to less fortunate people.

Let us consider some of the conditions, as exemplified in the text that heads this article, and as described in the extracts from the editorial in the *Druggists' Circular*. The Philadelphia College of Pharmacy is among the very first, if not the first, of the pharmacy educational institutions in America. Since 1825 its journal, the AMERICAN JOURNAL OF PHARMACY, has been ably edited by men irreproachably qualified in pharmacy, chemistry, botany and allied sciences. Under such auspices the college has been a record breaker as an educator of American pharmacists. Indeed, we would challenge any man to find a location in America not graced, and well graced, with a graduate of this college. From this institution have gone, in liberal numbers, teachers for all other pharmacy colleges, and we question if there be in all America a college of pharmacy that has not in its faculty at least one who has not taken his diploma from the Philadelphia College of Pharmacy. Its faculty has ever been the very bone and sinew of the American Pharmaceutical Association. To merely mention her graduates who have reached prominence in the pharmaceutical business and educational world, would be to fill this page with a list of names. The authors of the great United States Dispensatory, from its very beginning, have been professors in the Philadelphia College of Pharmacy, and when that admirable work, the National Dispensatory, appeared, the pharmacy, chemistry and botanical portions were from the pen of that wheelhorse of American pharmacy, John M. Maisch. The first conspicuous work on pharmacy published in this country, over half a century ago, was written by Professor Parrish, almost the founder of the Philadelphia College of Pharmacy, while the works of Professor Sadtler, the author-chemist, show him to have been one of the most renowned of the profession. From the days of these great men, to the present time, the illustrious record of the Philadelphia College of Pharmacy has been conspicuous, the latest publications being the prodigious work of Professor Joseph P. Remington, the present Chairman of the Revision Committee of the Pharmacopœia of the United States, and the recently revised "Text Book of Botany and Pharmacognosy," by Professor Henry Kraemer, the most complete and authoritative work known to us on this subject.

The classes of the Philadelphia College of Pharmacy have ever been kept filled by reason of the unquestioned capacity of the Faculty. As the graduates passed from state to state, and have been distributed in every section of our country, they have maintained, to this very day, their positions equally with the graduates of any other teaching institution in the land. Now comes the irony of fate. With the marvellous history that we have thus briefly and very incompletely sketched, extending over nearly a century to the present time, with its work of the present year and that planned for the next, with an unimpeachable equipment for teaching, and a building in which every department is modern and up to date, this great institution now stands publicly discredited in one of our states, as explained in the editorial of the *Druggists' Circular.*

The cause for this untoward state of affairs seems to lie simply in a difference of opinion between the officers of the Philadelphia College of Pharmacy and the New York Board of Regents, as to just what constitutes the necessary *entrance requirements* that give to an institution the best opportunity of serving a young man who comes to her doors, and through him the people, in the direction of pharmacy. In this process of reasoning, others as well as the Philadelphia College of Pharmacy, believe that the *end* reaction is more important than are the preliminary details.

WHAT THE ATMOSPHERE IS MADE OF.[1]

SIR WILLIAM RAMSAY IN LOWELL INSTITUTE LECTURES GIVES INTIMATE HISTORY OF THE DISCOVERY OF THE GASEOUS COMPONENTS OF AIR.

By John Ritchie, Jr.

If the Lowell Institute lectures on the gases of the atmosphere, by Sir William Ramsay, had done nothing more than show to the American public the simple and sterling character of the man and the extraordinary wealth of resource in expedient at his command, they would have been well worth the giving. But they did much more, for besides the academic story of discoveries that have made their mark upon the chemical world, there was the constant running fire of comment by one intimate with every detail in the long and complicated processes. How interesting, for example, in the naming of neon, to learn that it was the young son of Sir William, home on a vacation from school, who strolling into the laboratory learned of the discovery of the gas. "And is it truly new?" he queried, and on being assured that it was, he said, "Why not call it Novum?" The Latin terminology was, however, not of the customary order, so the Greek was called into requisition and "Neon" it became.

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[1] Reprinted from *Science Conspectus,* Vol. iii, (1912), pp. 14-18.

The lecturer took to his country most of the credit for discoveries with reference to the atmosphere, noting that Britain is proverbially ruler of the seas; that she, in the opinion of many is acquiring too great dominion over the land and in the third element, air, "all but one of the important [chemical] discoveries were made by Englishmen."

In his introductory lecture Sir William gave a short history of the chemistry of air and displayed in it some of his philological lore, telling his hearers that gas and ghost are kindred words, gust being another relative, indicative of the fancied relations between air and the spirit or life. "Gas is a made word," said the lecturer, "and is common to modern languages, while another such manufacture, 'blast' was coined in expression of the life of the stars. But since stars have no life from man's point of view, it has not come into familiar use."

The historical story was a very interesting one, pivoting on the old "phlogiston," which became a catch-all for the explanation of obscure phenomena. Phlogiston was that which substances lost in various processes of burning. The scum of melted lead—now known to be lead oxide—was made by phlogiston and if removed the lead was dephlogisticated. Air might likewise be dephlogisticated, and as this material was added or removed the intricate phenomena resulted.

The four elements of the ancients, fire, water, earth and air, with contrasted qualities, individually and in pairs, persisted till the fifteenth or sixteenth centuries. Earth was cold and dry; air, hot and moist; water, cold and wet, and fire, hot and dry. Boyle in the early sixteen hundreds; Mayow, born during the life of Boyle, but quiet and practically unnoticed and Stephen Hales, worked each diligently as chemists, considering all gases to be air and having no other notion. Mayow found out that air has "nitro-aëreal particles" and "mephitic," and Hales discovered that a great deal of gas can be derived from small quantities of solids. He distilled many things in his laboratory, including what are modern products; he saw that air is a chaos of elastic and inelastic things, but he failed to catch the import of his discoveries. Thus far everything had been hypothetical, there was no standard used and phlogiston was ready at every turn to account for strange results.

Joseph Black was the first real discoverer; he brought into requisition delicate scales, and came upon the idea of changed chemical condition later developed into "conservation of matter." An experiment with magnesia was repeated by the lecturer in much the same form as worked by Black, in which after decomposition, the magnesia was reconstructed. Black's pupil, Rutherford, born in 1749, took for his thesis the quantities of a cold, fixed air, which was really an investigation into the nature of the residual gases after certain kinds of experiment.

It was Priestley, born in 1733, who discovered oxygen, and he had such confidence in its life-giving qualities that he inhaled it, looking forward to the time when others might avail themselves of the luxury, "which till now has been enjoyed only by two mice and myself." Then came Lavoisier, who first mentions nitrogen under the name it still has with the French, azote, he determining that there are four kinds of air, common air, pure air, which is indeed oxygen, azotic gas and fixed air, which is carbonic acid gas. He had really the mystery of the air within his grasp, and produced hydrogen from water, but in the very last of his many memoirs defended phlogiston.

The general historical story ended with Cavendish, quiet and retiring, almost unknown save in very limited circles, who discovered the composition of water. He maintained the idea of phlogiston although the lecturer showed that he did so from the desire to speak to his contemporaries in current phraseology rather than on account of belief in it. He did question to himself the validity of this curious substance and, had he used the chemical balance in his experiments, would undoubtedly have discarded it altogether. He plainly states that where there is phlogiston there is always water and suggests that it may be the water that is effective. He worked largely for his own pleasure and was not quick to make public his discoveries. He did accomplish, however, most remarkable things, some of them in other fields. He accumulated facts which were accurate quantitatively; for example, that there is 1–120 of the air that will not combine, a figure that today, one hundred and thirty-five years later, is set at 1–84. He computed the density of the earth, arriving at the figure 5.4 with water for the standard, and more than a century of observation, measurement and computation has changed only the decimal places, the accepted constant being now 5.5777.

The work that this man did was wonderful whether taken in quantity or quality. He worked a great deal with the air, he analyzed it for sixty days and in many places, he showed its constant composition and really paved the way for the discovery of argon. One series of experiments was made to find out when a quantity of air was diminished by phlogistication, where the missing air went to.

How argon came to be discovered was one of the most charming of the series of lectures, for here Sir William Ramsay spoke of his relations with Lord Rayleigh and drew a pen picture of this distinguished and broad minded investigator, whose experiments in determining the relative weights of oxygen and hydrogen led first to publications from 1882 till 1893, the last year seeing a comparison between oxygen and nitrogen; next to the request to the members of the Royal Academy for suggestions, and last, to a meeting with Ramsay. Rayleigh had been working out the comparative densities of the gases and to check his observations he made use of gas produced in a number of different ways. He had oxygen from three different sources and found an agreement in the weights between them, but nitrogen when derived from ammonia he found to be lighter than when taken from the atmosphere.

At this juncture Ramsay suggested to Lord Rayleigh that the repetition of some of Cavendish's old experiments might give a clue to the mystery, and Rayleigh said, " Try it out yourself." The experiments, which were repeated on the platform, developed a method of consuming the nitrogen from ordinary air. The oxygen was first removed, then any traces of water and then again a trap was laid for any remaining oxygen. The nitrogen that was left was forced through chips of magnesium and was more or less consumed. At first there was a simple device for returning the nitrogen again and again to the magnesium and later automatic methods were devised which would effect this end till it was consumed. Means of testing were always possible and the speaker showed how in the successive devices there were improvements. It was evident after a while that there was an unconsumed residue, and this was argon.

Incidentally the lecturer told that he had taken magnesium for the selective material from the fact that in the old experiment when it was burned in a close crucible there was the odor of ammonia showing combination with the nitrogen of the air. In the later experiments, a mixture of lime and magnesium has been substituted for the magnesium chips. He noted that when the experiments were under way the announcement of the offering of the prize from the Hodgkins fund in the possession of the Smithsonian Institution was made. He spoke of this to Lord Rayleigh, suggesting to him to try for it, but the latter would do nothing by himself and made Ramsay take common cause with him.

In August, 1894, the announcement of the discovery of the new gas was made to the British Association. Sir Oliver Lodge was present and said, "These young men have discovered something that is new; have they also discovered its name?" A name was therefore sought, and since the gas was inert, the text, "Why stand ye here all the day idle?" was suggested. Argon is the neuter of the Greek word, idle, in this phrase.

The argon story of Sir William Ramsay, quietly and modestly told, was a key to the supreme scientific character of this leader in chemistry, for it showed his resources as well as his patient care and industry in trying thousands of experiments and one could see the acute inventive mind working all the time to evolve new processes or simplify and perfect those already known.

One fact that puzzled the discoverers of argon was the fact that its spectrum was subject to variations, and these were so curious that it was suggested that here might be a triad of gases and the names, Anglium, Scotium and Hibernium were even suggested for them. But the investigators worked on trying for results instead of anticipating them by processes of guessing. How to get more argon, how best to produce it and with what substance would it combine were the lines of research. First of all, typical animal and vegetable sources were tested to see, of course, whether some substance richer in argon than the atmosphere could be found. Mineral waters were also tried and it was finally concluded that argon is a component not of the atmosphere alone but is contained in various earthy products.

With reference to the combination of argon with other substances, the possible range was carefully tried out. The speaker named a score of active agents to which it was inert, the line was passed where gold is no longer resistant to change and then the limit for platinum. Argon was not affected by electric sparking nor by fluorine, which is of great activity in making combinations. Then the fierce energy of the electric arc was tried and at the other end of the thermal scale, liquid air. From all of these tests argon emerged unchanged and undiminished and the distinguished lecturer said, in concluding this part of his series of topics, "It may be possible to make a combination with argon, but in the light of knowledge to-day it is difficult to see how it can be done." The making of argon was one of the experiments of the evening of this lecture.

The story of helium was begun by Sir William at a number of different points. First there was related an outline of what was done by Doctor Hillebrand of the United States Geological Survey, who in heating some of the compounds of uranium—a rare element—found a gas whose spectrum was unknown to him. Janssen, the great French astronomer, during the solar eclipse in India, obtained with the comparatively new spectroscope a spectrum having a bright yellow line. The great English spectroscopists tried to place this and finally the world came to the realization that it was a new gas and it was named helium. Sir William Ramsay secured from Doctor Hillebrand some specimens of his mineral, cleveite, for experiment and soon saw that the spectrum was not that of sodium which also has a bright yellow line. Taking it to Sir William Crookes, who was better fitted out with spectroscopic apparatus, the latter viewed the spectrum and pronounced it to be that of helium, then first identified from earthy materials. The next thing, of course, was to find out by what it could be produced in larger quantities. "The proverbial needle in the haymow was simplicity itself," said the lecturer, "compared with this task," and the outlining of what was done in the research is testimony to the splendid resources of the great Englishman, or rather Scotchman. The British Museum was ransacked for minerals and about two hundred likely samples were taken. These were subjected to tests, but no new spectrum resulted; then the gases of mineral waters were tried and even the volcanic gases of Iceland, to which country Sir William journeyed on his quest. Meteorites were heated and a great range of such experiments tried, but all without avail. "And all this time," said the lecturer, "it was all about us in the commonest thing we had, the air." This was in 1896 and the means which were to put the great results into the hands of the investigators were just coming into reach of scientific men. This was liquid air, and by way of return for courtesies of the laboratory the first litre of this product made by an Englishman in a new way was sent to Sir William. The relation of this to the discovery was that cocoanut charcoal has an extraordinary appetite for gas and the colder it becomes the more gas it will absorb. Charcoal chilled to the very low figure of the temperature of liquid air does select from mixtures of gases in contact with it all of those then known to be in the air excepting helium. This gas was not absorbed in such processes and the scientists collected it in sufficient quantity for the determination of its various chemical constants.

Gaps in the rhythmic order of qualities as shown by the tabulations of chemical elements furnished the suggestion that there were missing elements and the low temperatures of liquid air and hydrogen furnished a means of separating them from their companions. In a rough way the process may be explained by the different temperatures at which the different gases liquefy or freeze. One gas will become liquid while another is still a gas, or freeze while its companion is a liquid. The gas can be pumped out or the liquid drawn off, while the second gas remains in different condition.

The litre of liquid air that was received by Sir William was used largely for amusement, the scientists literally playing with the strange, new material. When it was nearly all gone, scientific tests were suggested and the familiar treatments were given it. It was found that the residue had a higher weight than the normal one for argon. From this circumstance there came the separation of krypton, so called because it had been hidden.

Of course with the increasing ease with which liquid air could be obtained such experiments were repeated and it was noticed that even with the krypton taken out, there was always a bubble of residue. This was tested in the ways known to chemists; the spectrum showed that it was still a different gas and xenon, the stranger, was produced. It was the separation of the gases by means of their different vaporizing points that was now used in the discoveries. Xenon proved to be the heaviest gas then known, sixty-six times the weight of hydrogen.

At this time, in 1898, the business of liquefying air assumed relatively great magnitude, and the investigators in London were able to acquire a considerable quantity—fifteen litres—of argon. This was treated in the various ways that had been evolved in previous experiments and from it was produced or rather separated a light gas with red spectrum. This was neon. Still more recently through the ability to get larger quantities of argon, it has been possible to gather as much as 120 cubic centimetres of neon. This has been tested in all the ways known to chemistry of today to determine whether still other gases are in combination with it, but it has resisted separation so that the discussion in this direction seems to be finished.

Although it would seem as if here would be the end of the story of gases in the atmosphere, the final lecture brought out the fact that still another remained, which in due sequence of investigation and discoveries, was found and its characters determined. This was niton, so-called because when frozen it shines. The story was one that took up the investigations in the matter of radio-activity. It is known that electricity may be gathered high in the air and its source was always a mystery. It is now known that it is formed by the decomposition of the gases. The radio-activity story led up to the showing that there is a radium emanation which has certain peculiarities and relationships in a curious group of activities. This is now known to be a gas and a constituent of air. Its presence was suspected at last through a gap in the chemical tabulation of elements. Hydrogen was suspected of being possibly in combination with something; the temperature of the combination was lowered; there was a process of solidification at a temperature at which hydrogen was still unfrozen, the latter was pumped out and the residue examined. Thus the gas niton was found, an unstable one, it would seem, for the members of the radium group of substances are continually parting with atoms or electrons and becoming other members of the group. Helium and electrons are alternates in this loss, which is a phenomenon giving rise to new concepts in chemistry.

PROGRESS IN PHARMACY.

A QUARTERLY REVIEW OF SOME OF THE LITERATURE RELATING TO PHARMACY AND MATERIA MEDICA.

By JOHN K. THUM, Ph.G., German Hospital, Philadelphia, Pa.

ACONITE ALKALOIDS.—Schulze and Biertung (*Archiv der Pharm.*, 1913, 8) have carried out an exhaustive study of the alkaloids of *Aconitum Lycoctonum.* The two bases of the plant were termed lycaconitine and myoctinine. By hydrolysis of either alkaloid by means of hydrochloric acid a new alkaloid is obtained, to which the name anthranoyl-lycoctonine has been given. The new alkaloid is very fluorescent in either alcoholic or ethereal solution.

ADULTERATED GENTIAN.—Tschirch, upon an examination of some samples of powdered gentian, found that they were adulterated with yellow dock and blunt leaved dock, mountain rhubarb, almond shells and barley bran. (*Schweiz. Woch. Chem. Pharm.*)

AN AUSTRIAN INVESTIGATION OF COMMERCIAL DIGITALIS PREPARATIONS.—In a recent paper Weis of Vienna reviews some of the methods for the physiologic standardization of digitalis. In his investigation of commercial "ready-made" tinctures he used the frog heart method as described by Hale in Hygienic Laboratory Bulletin 74. He found these tinctures to be fifteen times less active than the tinctures made from good leaves in accordance with the directions of the Austrian Pharmacopœia. He also states that the pharmacist would fulfil his obligations to the physician and patient much better if he would prepare tinctures himself instead of dispensing those made by manufacturing houses. (*Jour. A. M. A.*, 1913.)

A NEW ALKALOID.—Bridel (*Zeit. Allg. Oest. Apoth. Verein*, 1913, 603) has isolated an alkaloid from the rhizome of *Menyanthes trifoliata*, which he terms meliatine. It is lævorotatory, and is soluble in water, alcohol, and acetone. It melts at 223°. Its formula is $C_{45}H_{22}O_9$. (*Chemist and Druggist*, Mar. 15, 1913.)

A NEW ALKALOID FROM PILOCARPUS.—According to Heger and Rogues if a mixture of all the alkaloids from Pilocarpus microphyllus be changed into nitrates or chlorides, and these recrystallized, the bases remaining in the mother-liquid can be made by fractional precipitation to give a new alkaloid, to which the name *carpilline* has been given. This alkaloid is dextrogyrate, and a weak mono-acid base with the formula $C_{16}H_{18}O_3N_2$.

AN OPIUM GLUCOSIDE.—Glucosides closely resembling alkaloids, which have been termed glyco-alkaloids, are known, such as solanin and achillein. A similar body, although not occurring naturally in opium, can be formed by treating morphine in soda solution with aceto-bromglucose in acetone solution. The resulting glucoside is crystallized from 50 per cent. alcohol, and forms bitter tasting needles of the formula $C_{17}H_{18}NO_3C_6H_{11}O_5H_2O$. (*Chem. and Druggist,* Mar. 15, 1913.)

BACTERIAL VACCINE THERAPY: *Its Indications and Limitations.*—Under the foregoing title a special article is appearing in the *Jour. A. M. A.,* continued from week to week, that is of much interest and could be read with much profit by pharmacists in general.

BELLADONNA CULTIVATION IN CALIFORNIA.—Two crops of leaves were harvested last year; the leaves contained considerable stems, but the percentage of alkaloids present was much higher than official requirements, some being as high as 0.84 per cent., the official minimum being 0.30 per cent. The shipment of belladonna from California was the first in the history of this country. (*Pacific Druggist.*)

" BIG BUSINESS " AND SCIENCE.—Under the foregoing title an editorial in the *Journal of the A. M. A.* has this to say: " Much has been written on how science and commercial industries (especially chemical industries) have been of mutual aid in Germany, and regrets have been expressed that alliances of this nature are not more frequent in the United States. Physicians seeking for impartial accounts of new drugs, however, often have occasion to wish that many of the communications which appear in German medical journals had been written by those less dependent on manufacturers. How little the big German chemical interests hesitate to sacrifice science for the sake of 'business,' moreover, is strikingly illustrated by a remark of Ostwald, a man who has probably done more for both German science and chemical industry than any other one living. Ostwald for many years has been endeavoring to secure the establishment of an international institute of chemistry, one of the functions of which is to be the maintenance of a card index of all the discoveries in chemistry so that an investigator anywhere in the world can have instant access to everything which has been written on a particular subject in which he may be interested. Violent opposition to this scheme, according to Ostwald, has developed on the part of the big chemical houses of Germany, the reason apparently being that these houses have established such catalogues for their own use, the possession of which gives them great advantages over the smaller houses in cases of patent litigation, etc. Ostwald says, however, that such an institute will be founded 'in Belgium, or in France, or, what is most probable, in America.'

"Will America prove itself worthy of this expression of confidence?" and the editorial goes on to say that it depends altogether on the strength of the scientific as compared to the commercial spirit.

ENLIGHTENED STAND OF A MAIL-ORDER HOUSE.—The *Journal of the American Medical Association* in a recent number comments favorably on the action of a large western mail-order house in discontinuing the sale of "patent medicines." In their new catalogue the company tells its patrons why it no longer lists secret preparations. Explanatory of its attitude in the matter it says in part:

"Many of our customers will be surprised and possibly some of them disappointed to find that this catalogue no longer lists the various patent medicines we have carried in the past. Our decision to discontinue the sale of patent medicines was made after careful study of the question from all sides and is based on our policy of handling only dependable merchandise—merchandise that we believe will give the service our customers have a right to expect. We have come to believe that patent medicines do not conform to this standard; in fact, we are confident that those of our customers who have investigated the matter thoroughly will agree with us that, considered in all its phases, the patent medicine business is a public evil.

"We are not prepared to take the extreme position that no medicines of any kind, regardless of how simple or in what manner advertised, should be offered direct to the public. However, even such a state of things might easily be better than the present situation, in which we find valueless and even dangerous medicines offered to the public through the medium of advertising that is extravagant, misleading and deceptive—advertising calculated to deceive the well into the belief that they are sick and to induce the sick to pin their faith to ineffectual means for recovery."

EUPHORBIA PILULIFERA.—In a communication to the Pharmamaceutical Society of Great Britain, Dr. F. B. Power and H. Browning give the result of a complete chemical examination. Among the various constituents of this drug which have now been isolated and described there is none to which any specific physiological action can be attributed. Such therapeutic virtues as the plant has been presumed to possess would therefore not appear to depend upon any single substance of a definite chemical character.

EPINEPHRIN.—Solutions of epinephrin treated with gold chloride give a decided red color. Gautier says that this reaction is so sensitive that this drug can be detected in extremely attenuated dilutions.

THE PHARMACIST AND THE PATENT MEDICINE.—The foregoing is the title of an editorial in the April number of the *Journal of the A. Ph. A.*, in which Editor Beal, as a tentative proposition, suggests that the A. Ph. A. appoint a Council on Proprietary Medicines. Among other things its function to be that of determining whether there is such a thing as a legitimate proprietary medicine which a pharmacist may conscientiously recommend and sell to the general public. " And whether on the whole the public is benefited or injured by the use of such ready-made medicines."

If this conclusion can be arrived at, then a line of demarcation between legitimate and illegitimate remedies, whether made by the individual druggist, by druggists' co-operative bodies, or otherwise.

That there may be some objection to the organization of such a Council because of the existence and work of the Council on Pharmacy and Chemistry of the A. M. A. he admits, but does not regard it as a valid one. The main reason for the organization of the new council would be to place organized pharmacy on record on this question.

Let us hope that when organized pharmacy does take its final stand on this vital question of public health it shall be on the same high level taken by organized medicine.

PHARMACOPŒIAL MATTERS.—Osborne in *Jour. A. M. A.* for May 10, 1913, just three years from the date of convention, makes a final plea for a useful pharmacopœia. He says in part: " Shall we have the United States Pharmacopœia up-to-date and of scientific and therapeutic value, or ,shall it be a book of ancient drug lore intermixed with drugs of real value." In an up-to-date book of this age, a drug, in order to gain acceptance, must have therapeutic value, be pure, and the preparations must be of the best.

The chairman of the pharmacopœial revision committee has been quoted as stating that nearly all of the reports of the sub-committees are finished and that the executive committee has already passed upon 588 articles. Just when the book will be issued from the press the chairman is unable to state.

PROPAGANDA FOR REFORM.—The question of the regulation and sale of nostrums and proprietary medicine has recently been discussed in the Italian Parliament. In the course of the discussion some of the representatives called the attention of the government to the danger to health from the use of proprietaries without the sanction of medical advice. Various methods for controlling the sale of these preparations were suggested. It was also urged that strong effort should be made to awaken the "hygienic conscience" of the public. The United States was mentioned as the first country to awaken the public against the evils and dangers to public health of nostrums and fraudulent labels. (*Jour. A. M. A.*, May 10, 1913.)

PROPOSED PHARMACEUTICAL LEGISLATION.—The Arkansas legislature is considering a bill which prohibits the sale of any patent or proprietary medicine that does not bear on the label a complete schedule of all the ingredients contained therein; it also prohibits the distribution of samples of medicines. This is legislation that is desirable from every view-point. In Missouri an amendment to the state food and drugs act is proposed requiring a statement on the label not only of the drugs named in the federal act, but of "any other drug." Another amendment prohibits the sale of coca, opium and their preparations except on a physician's prescription. Nebraska legislature has a bill before it which forbids false or fraudulent therapeutic claims. Another bill prohibits the sale of patent or proprietary medicines containing poisons unless the poisonous ingredient is declared on the label; another requires the use of English in writing prescriptions and forbids the use of any other language. The New Hampshire legislature also has an elaborate anti-narcotic law under consideration. Kansas is discussing a rather comprehensive bill which remodels the pharmacy act, defines the qualifications for registration, offers a poison schedule and provides that the medicines dispensed by physicians shall be subject to inspection and must also comply with the standards provided. In Iowa a therapeutic amendment to the food and drugs act; also a bill which prohibits the compounding and manufacture of any preparation containing narcotic drugs except by registered pharmacists or assistant registered pharmacist under the supervision of a registered pharmacist; also a bill prohibiting the publication or distribution in any form of fraudulent advertising; Idaho contemplates an anti-narcotic law, and prohibits the sale of cocaine, opium or their derivatives or compounds except on the written prescription of a physician. Indiana also has one in view with exceptions permitting the sale of proprietaries containing minimum quantities of narcotics. New Mexico considers a bill which forbids the distribution of harmful and injurious articles. North Carolina legislature has for it's consideration one which goes so far as to make it unlawful to prescribe or recommend any secret drugs and that the prescriber must be required to tell the full composition of the preparation to the patient. North Dakota has a bill which prohibits the distribution of samples of preparations containing poisons or any of the drugs named in the federal regulations except upon the special personal request of the householder. Oklahoma has in view a bill which, among other stringent requirements, gives authority to health officials to require medical inspection for all handlers of foods and drugs who are suspected to have contagious, infectious and loathsome disease.

RHAMNUS CATHARTICA.—Exhausted with boiling alcohol a brown substance separates on cooling which on recrystallization forms colorless, microscopic crystals, melting at 83° to 85°. This body has been named rhamnosterin. On further treatment of the alcoholic solution a precipitate was obtained which was extracted with benzol; on cooling, this solution gave a red mass from which frangula emodin and a body with a yellowish fluorescence, and named rhamnofluorin, was isolated. The authors also obtained chrysophanol, chrysophanic acid, *d*-glucose and a tannic-like body. (Tschirch and Bomberger, in *Schweiz. Woch. Chem. Pharm.*)

SANTONIN.—A rather delicate test for this drug is as follows: A small crystal is agitated in a test tube with a few drops of ethyl nitrite, then add a few drops of potassium hydroxide test solution; if santonin is present a deep rose color is produced. The potassium hydroxide produces the color reaction; ethyl nitrite alone does not react with santonin, which distinguishes it from aloin and resorcin, these drugs being colored red by ethyl nitrite. (*Anal. de Chim. Analyt.*)

SUGAR AND ALCOHOL FROM SAWDUST.—British chemists have made the manufacture of sugar from sawdust an established fact. This is chiefly important, because, like all sugars, it may be converted into alcohol. This new process is a modification of the Classen method, which has been known for some time but never used commercially. It is claimed that 200 tons of sawdust produce 6000 gallons of ethyl alcohol, besides large quantities of acetic acid and wood naphtha. (Grosh, *Druggists' Circular.*)

Strophanthinum.—Strophanthin-Kombé of commerce is amorphous, not crystallized as this substance is described in the U. S. P. The melting point should be omitted, as official strophanthin is a mixture of variable composition. (*Jour. of A. Ph. A.,* April, 1913, page 5.)

Sulphonethylmethanum.—The melting point should be replaced by a range of 75° to 77°, which limits should be definitely required as a test of purity. In the permanganate test 20 c.c. of the filtrate from the preceding test should be taken and 0.05 c.c. of N/10 potassium permanganate (measured with a 1 c.c. pipette). As the test now stands, it is too vague to be of use. (*Jour. A. Ph. A.*, April, 1913.)

Tariff Reductions for Chemicals.—So far as the revision of the tariff in connection with drugs and chemicals is concerned a glance over Schedule A shows generally a sweeping reduction in present rates.

Terpini Hydras.—The official statement that it is permanent in the air does not agree with practical experience, which shows that it is somewhat efflorescent and often does not contain fully one molecule of crystal water. For this reason a determination of the melting point, as a test for organic impurities, is desirable, and is preferably made after removal of the water by drying the finely powdered substance over H_2SO_4 to a constant weight, as the melting point of the hydrate varies with the degree of hydration. Anhydrous terpin hydrate should melt between 102° and 105°.

Test for Formaldehyde.—Denigés (*Comp. rend.* through *Pharm. Zentrh.*) offers this method for detecting formaldehyde: 5 c.c. of suspected solution is mixed with an equal volume of solution of fuchsin disulphite and 1.30 c.c. of H_2SO_4 sp. gr. 1.66; if formaldehyde be present a blue color will show. This color reaction manifests itself with as small a quantity as 0.01 milligramme within 5 minutes. This test is applicable to any substance from which formaldehyde is easily separated by sulphuric acid.

Test for Nitrites.—A. C. G. Egerton states that *a*-naphthylamine sulphanilic acid is impracticable for use as a colorimetric reagent, owing to the precipitate formed. He finds that dimethylaniline dissolved in acetic acid gives a coloration with a solution containing 0.005 gramme N_2O_2 per c.c., at which concentration, he states, the presence of nitrites in a water becomes dangerous. (*Chemist and Druggist,* Mar. 1, 1913.)

The Purity of Commercial Sodium Salicylate.—The results of a chemical investigation of synthetic and natural sodium salicylate seem to warrant the conclusion that the cheapest commercial synthetic sodium salicylate is the equal of the higher-priced brands of the synthetic kind or the costly "natural" product. According to a pharmacologic study by Waddell there is no difference in the physiologic action of the synthetic and "natural" sodium salicylates. (*Jour. A. M. A.,* April 19, 1913.)

CORRESPONDENCE.

American Journal of Pharmacy,
Philadelphia, Pa.

Dear Sirs:

I am pleased to inform you that the case of Commonwealth of Pennsylvania *vs.* B. T. T. Tobin, which was practically *vs.* Sharp & Dohme, as Mr. Tobin was our Philadelphia Agent and the Pennsylvania State Pharmaceutical Examining Board, which enforces the Pure Food and Drug Act of 1909 of Pennsylvania, could only proceed against a local person and not against a Maryland or other foreign corporation, has on May 1st been decided in favor of Sharp & Dohme and against the said Pharmaceutical Examining Board. The case has been pending since August, 1910, due mainly to delays of one kind or another on the part of the Board as we were quite desirous of having the case tested and settled, since it involved the broad and important question of reading regulations adopted by an executive board into a law passed by a legislative body.

The case was one involving a bottle of Essence of Pepsin 1 : 2000 manufactured by Sharp & Dohme, which Sharp & Dohme have been supplying for the medical profession to the drug trade since 1888 and always of the same consistence, formula and digestive power. According to the Federal Pure Food and Drug Act and the Pennsylvania Pure Food and Drugs Act of 1909, this essence of Pepsin was correctly labelled and could legally be sold in Pennsylvania or any other state, and for the following reasons, to wit: 1. It was an estabished product for which a fixed demand has existed for twenty-three years and it has always given satisfaction. 2. It was correctly labelled, inasmuch as although it was not of the

National Formulary digestive strength of 1:3800, it had plainly stated upon its label its correct and claimed digestive power of 1:2000. 3. It was found by the chemists of the Pharmaceutical Examining Board to be above the digestive strength claimed upon the label and was, hence, found to be a better product even than it was held out to be by Sharp & Dohme.

This Essence of Pepsin case was brought by the Pennsylvania Board to test said Board's right by law to make regulations arbitrarily established by itself part of the organic law of the state. Therefore, this question is one of great importance to the drug trade all over the country, as there exists a growing tendency for Federal and State Boards, whose duty it is merely to execute laws passed by Congress or a State Legislature, to formulate regulations and endeavor to enforce them as part of the organic law respectively of the country or state. The Sharp & Dohme Essence of Pepsin was made the test case, but it has been difficult to get the Pennsylvania Board to bring the case to trial, as the Board evidently felt it had no strong case and that the case was going to be contested by able counsel and competent witnesses. As it involved a broad question of moment to the entire drug trade of the land, Sharp & Dohme had fully intended to take it up to the Court of Appeals, and if possible to the U. S. Supreme Court, in the event that it had been shown that the case was one of interstate commerce instead of intrastate commerce.

The case came up for trial in the Court of Oyer and Terminer before Judge Audenried in Philadelphia on Thursday, May 1st, and was argued by Assistant State Attorney Maurer for the Commonwealth of Pennsylvania, representing the Pennsylvania State Pharmacy Examining Board and by Messrs. Chas. Biddle and Henry LaBarre Jayne, of the firm of Biddle, Paul & Jayne, of Philadelphia, for Sharp & Dohme. The witnesses for the Board were Messrs. Rohrman, of the Philadelphia Drug Exchange; Christopher Koch, Vice-President of the Pennsylvania Examining Board; Professor C. H. LaWall, of the Philadelphia College of Pharmacy; L. L. Walton, Secretary of the Board, and H. C. Blair, of Philadelphia. The witnesses for Sharp & Dohme were Dr. A. R. L. Dohme, President of that corporation, and Dr. Herman Engelhardt, their chief chemist.

After the bottle of Essence of Pepsin had been brought into the case and Prof. LaWall had testified as to what was the U. S. P.

and the N. F., and that he had found that the Essence of Pepsin had shown on digestive test by the U. S. P. method for testing pepsin products, that it was not below its claimed and labelled strength of 1 : 2000, but considerably above it, and was, therefore, correctly labelled and not misbranded, the claim was made by the Assistant District Attorney that it was misbranded, because according to the regulations of the Board no Essence of Pepsin could be sold in Pennsylvania that was labelled Essence of Pepsin unless it was of the N. F. strength of 1 : 3800, *i.e.,* one part would digest 3800 parts of coagulated egg albumen according to the U. S. P. test. Thereupon Mr. Biddle objected and gave as his reason for so doing that regulations were not laws, and at once Judge Audenried interposed and said, If your case rests upon the effectiveness of regulations drawn by your Board, then I wish to state most emphatically that the legislature of the Commonwealth of Pennsylvania never intended that such a body of men as constitute this Board or any Board, *should have the power to read regulations framed by them into the organic law of this state.* When Mr. Maurer admitted that that was the crux of the whole case, the Judge then ordered the Jury to bring in a verdict of not guilty and dismissed the case.

This decision, hence, establishes for the drug trade the important fact that regulations drawn by executive boards appointed to execute Pure Food and Drug Laws have not the effect of law, and in so far as they affect or modify the law in any way are null and void. The Sharp & Dohme Essence of Pepsin case, hence, promises to be a crucial and important one for many existing conditions and cases pending based upon the regulations of executive boards held out to have the force of law.

Very truly yours,
A. R. L. Dohme.

Baltimore, Md.,
May 2, 1913.

OBITUARIES.

OSCAR OLDBERG.

Dr. Oldberg, Dean Emeritus of the Northwestern University School of Pharmacy, died, at Pasadena, California, on February 27, 1913, as the ultimate result of a stroke of paralysis suffered several years ago. He was born in Alftla, Sweden, on January 22, 1846, and educated in the Swedish Gymnasium at Gefle, and later studied at Upsala. Prof. Oldberg came to America in 1864. For nearly fifty years he was engaged in various phases of pharmaceutical work as a teacher, an author and an editor, and he succeeded in leaving a permanent influence for good upon the professional development of pharmacy.

As a teacher and as Dean of the School of Pharmacy of Northwestern University, Professor Oldberg will be remembered by his many students for the lucidity with which he imparted his knowledge and for his sympathetic comprehension of their viewpoint. He taught as one realizing that as a teacher he was helping to shape the future development of pharmacy through the lives of students who were to become the future pharmacists of America.

In his work as an author and editor and as a contributor to the Proceedings of the American Pharmaceutical Association, and the Pharmaceutical journals, he applied himself with diligence and singleness of purpose that will cause future generations to regard him as a prophet and as one of the peerless leaders in pharmaceutical education.

His intellectual integrity coupled with his sense of humor made him a delightful companion, and one's associations with him are to be compared with rambles in nature where there are no discords but a harmonious blending of all the forces of nature and all the varied forms of life. As a man and as a friend all who knew him will grieve that he is gone and rejoice that he has lived.

Upon coming to the United States Professor Oldberg very soon entered upon positions of responsibility and trust. In 1872 we found him located in Memphis, Tenn., and acting as Vice-Consul of Sweden and Norway. Shortly after this he became Chief Clerk and Medical Purveyor in the United States Marine Hospital Service at Washington. During this time he also was made a member of the faculty of the National College of Pharmacy. By reason of his knowledge and ability he was elected a member of the Committee of Revision of the U. S. Pharmacopœia in 1880 and was re-elected in 1890 and 1900. In 1908 the American Pharmaceutical Association elected him to the Presidency of that body. Outside of membership in the American Pharmaceutical Association and the Illinois State Pharmaceutical Association Professor Oldberg was enrolled as a member of relatively few Societies. He was elected an honorary member of a number of pharmaceutical bodies, and became honorary member of the Philadelphia College of Pharmacy in 1911. Dr. Oldberg also was Secretary of the Seventh International Pharmaceutical Congress in 1893.

Professor Oldberg's most important work was in the organization of the Illinois College of Pharmacy in 1880 and which later became a part of Northwestern University. He was the leading spirit in this school from the beginning and continued active in its work until his health was undermined in 1911. He was not only Professor and Dean, but he was virtually the presiding executive officer and registrar. All matters pertaining to the School were under his supervision and he saw to it that every phase of the work was done economically and efficiently.

Dr. Oldberg wrote a number of valuable works appertaining to pharmacy, among which the following may be mentioned:

"Companion to the U. S. Pharmacopœia." (1884.)
"Weights and Measures." (1885.)
"Home Study in Pharmacy." (1890.)
"Fifteen Hundred Prescriptions and Formulæ." (1892.)
"Inorganic Chemistry." (1900). "Pharmacy." (1913).
"Pharmaceutical Problems and Exercises." (Fourth Ed., 1907).

Dr. Oldberg was a constant contributor to the Pharmaceutical magazines. As editor of the *Bulletin of Pharmacy* for three years, he left an impression for good upon the subsequent development of this Journal. We reproduce herewith an appreciation by the Editor of the *Bulletin of Pharmacy* (p. 105):

> "In the death of Oscar Oldberg there has passed away another one of the small group of five or six real leaders of thought and progress so far produced in the history of American Pharmacy.
>
> "For considerably more than a quarter of a century Professor Oldberg played a unique and important role in pharmacy. He was a sort of philosopher on the mountain top—a seer who had a calm, detached, broad view of the scene below him on all sides, who observed and studied and pondered over the shifting panorama, who realized what was missing here and there to complete the picture, who more than once saw danger looming up and gave warning of its approach, and who with something of the Old Testament prophet in him pierced the future, foretold what would happen, and sought with forceful voice and eloquent pen to have wise and abundant preparation made for the inevitable.
>
> "Ideas often outlive the men who conceive and give them utterance. If they are born of truth and rooted in human need, they go on developing in strength and force, and they are finally accepted by a public which has lost sight of their origin. It is yet far too early to measure the full results of Professor Oldberg's work as a leader, but already many of the reforms first agitated by him, and since taken up by others, are gradually being realized.
>
> "For years he declared with great force and vigor that the boards

of pharmacy themselves had the power and authority to raise educational standards if only they would exercise it, and now we find many of them insisting upon a certain measure of preliminary education, denying "experience" credit to the colleges which do not live up to prescribed standards, and establishing requirements of one kind and another. He always insisted, too, that the laws must provide for "assistant pharmacists" as well as fully registered pharmacists; that the requirements for one class must be much less severe than for the other; that the number of clerks would thus be incidentally increased while the number of stores would be decreased —and we find now that this idea has been quite generally accepted and that it is gaining force year by year. Back in 1906, and even before that, he declared that the boards and the colleges were all traveling their own paths; that the condition was one of confusion worse confounded; that agreement should be reached on a syllabus of subjects to which they could all conform—and now we have the syllabus movement well established, growing in favor, and promising much for the educational future of the calling.

"We do not propose on this occasion to take up in detail the numerous educational, registrational, and legislative reforms which Professor Oldberg urged with singular logic, power, and patience for so many years. In epitome some of them may be found in the 13 principles prepared for discussion at the Indianapolis meeting of the A. Ph. A. in 1906, and it is our conviction that these principles, and the Professor's address that year as chairman of the Section on Education and Legislation, were models of clear thinking, constructive planning, and convincing English. Already Professor Oldberg as a prophet is not without much honor in his own country, but we venture the opinion that he will come into his own more and more as the years go by.

"And what a fine, lofty character this is to which we are giving honor and shall continue to give honor! Never was there the slightest stain on it. Never the least deviation from the path of quiet, simple honesty and dignity. Hundreds of his students, scattered over this and other countries, felt an affection for him amounting to reverence. Thousands of others, comprising all who knew him, or who had read his printed messages, or had been inspired by his high and lofty ideals, will cherish a great and lasting respect for his memory.

"For he was a Man no less than a Leader."

On May 19, 1873, Dr. Oldberg was married to Emma Parritt, Youngstown, Ohio, who survives him and is now residing at Pasadena, California. In his marriage Prof. Oldberg was very fortunate for Mrs. Oldberg was not only a woman of culture but was always ready to coöperate in her husband's plans and assist in making his work successful. They had three children all of whom are living. The older son, Arne Oldberg, is Professor and Dean of Northwestern University School of Music. The younger son, Virgil O. Oldberg, is living in Detroit, Michigan. The only daughter, Mrs. Olga Smallwood, resides in Chicago. H. K.

ALEXANDER H. JONES.

Alexander H. Jones, for many years connected with the firm of Powers and Weightman and an authority upon tariff questions, died on December 23, 1912, at his home in Germantown, aged 76 years.

Mr. Jones received his early education in the public schools of Philadelphia, and graduated from the Central High School when but sixteen years of age.

In August, 1852, he entered the employ of Powers and Weightman, where he remained until March, 1902, when, owing to a paralytic stroke, which incapacitated him from further business, he retired. While in the employ of this firm, he was steadily advanced and finally became the firm's representative in many important matters, especially in those of tariff legislation affecting the chemical industry.

Mr. Jones made a close study of the tariff, particularly that portion that pertained to the chemical industry, and was intimately associated in his tariff-work with such men as the late Senator Allison, Ex-Senator Aldrich; also, the late Wm. D. Kelley, and Samuel J. Randall, Congressman Dalzell, and many other prominent protectionists. His opinion was often asked by congressional committees, when tariff matters were under consideration, and the information he furnished was always comprehensive and dependable.

It was by reason of his intimate knowledge of the tariff and legislative matters that he was elected as Chairman of the Committee on Legislation of the N. W. D. A., some years ago, in which position he did much good service for the trade in general.

His widow and one son survive him. J. W. E.

CHARLES SHREVE BRADDOCK.

Charles Shreve Braddock was born in Medford, Burlington County, New Jersey, May 22nd 1828, and was of Quaker parentage.

His parents were William Rodgers Braddock and Sarah Shreve, who were descended from the first settlers of that name in the county in 1702, and on the mother's side from the Holland family of Shreve who came from New Amsterdam to New Jersey.

He received his education in private and public schools, early being proficient in Latin and higher mathematics. While a young man he helped his father survey South Jersey, and saw the possibility of growing cranberries, which he put to practice in 1849, by bringing the vines from Cape Cod, thus being the first to plant cranberries in New Jersey. He graduated from the College of Pharmacy, in Philadelphia, in 1851, and at the time of his death, December 1st, 1912, was the oldest member of his class.

He spent a year as prescription clerk to the Apothecary of Jefferson College, forming life long friendship with such men as Dr. Da Costa and others of that period. He was employed in a New York Pharmacy (corner Broadway and Park Row, where the St. Paul Building now stands) for over a year, and started the first drug store in Haddonfield, New Jersey, in 1853. In 1857 he married Ann Zane Collings, of Collingswood, New Jersey, and five children survive him.

PHILADELPHIA COLLEGE OF PHARMACY.

NINETY-SECOND ANNUAL COMMENCEMENT.

The exercises connected with the ninety-second annual commencement of the Philadelphia College of Pharmacy were held in the American Academy of Music on Thursday evening, May 22nd. The prayer was made by the Rev. Edwin S. Carson, after which the degrees were conferred by President Howard B. French.

The title of Master in Pharmacy (Ph. M.)—*honoris causa*—was conferred upon each of the following: Samuel Philip Sadtler, Ph. D., LL.D.; Henry Kraemer, Ph.G., Ph.B., Ph.D.; James Hartley Beal, Sc.D., Pharm. D.; Frederick Belding Power, Ph.G., Ph.D., LL.D.; and Joseph Winters England, Ph.G.

The following are the names of those receiving the degree of Doctor in Pharmacy (P.D.) together with the subjects of their graduating theses:

Name	Thesis	
Albeck, Ray Augustus	Kieselguhr	Pennsylvania
Arnold, Guy Raymond	Pigments	Pennsylvania
Austin, Jacob	Hydrargyrum and the Halogens	Pennsylvania
Bailey, Albert Henry Anthony	Extract of Cascara Sagrada	New Jersey
Beach, Malcolm	Extemporaneous Ointments	New York
Beaver, Joseph Andrew	Combretom Sundiacum	Pennsylvania
Blasingame, Walter Alvin	Calcium Hypophosphite	Georgia

Bost, William Dale, [P. C.]	Liquor Plumbi Subacetatis	North Carolina
Brisgol, William Phillip	Basic Aromatic Elixirs	Pennsylvania
Brown, Charles Henry	Elixir of the Phosphates of Iron, Quinine and Strychnine	Pennsylvania
Brown, West Smith	Alcohol—Source and Cost of Manufacture	Pennsylvania
Buckalew, Raymond Gager	Calx Chlorinata	Pennsylvania
Burke, Walter Peter	The Manufacture of Wine	New Jersey
Campbell, Frank William	Flaxseed and its Products	Virginia
Case, Joe Stinchfield	Acidum Hydrochloricum Dilutum	Ohio
Clark, Edgar George	Nux Vomica	Pennsylvania
Comber, Miss M. Beatrice	Sodium Phosphate	Pennsylvania
Crouse, Albert Roy	Mistura Ferri Salicylatis	W. Virginia
Cutter, Paul Styer	Manufacture of Prescription Bottles	New Jersey
Dunkle, Robert Pattison	Carmine	Pennsylvania
Dunkleberger, Eugene Blair	Narcotics	Pennsylvania
Eakle, Roy Sperow	Perfumery	Maryland
Eberly, Russell Neely	Liquor Calcis	Pennsylvania
Engstrom, Myrtle Emmett	The Recovery of Phosphoric Acid in the Manufacture of Hydrogen Peroxide	Pennsylvania
Fairlamb, William Hamer	Tinctura Vanillae	Pennsylvania
Fitzgerald, Charles Edward	Sapo Mollis	Pennsylvania
Ford, Harry Billings	The Manufacture of Effervescent Salt	Connecticut
Foltz, Alvin Elmer	Ferrum	Pennsylvania
Foster, Sylvan Lorraine	Manufacture of Paper	Delaware
Fox, Joseph Patrick	Nitro-Glycerin and its use in Coal Mining	Pennsylvania
Frank, Harvey	Color Standards for Liquids	Pennsylvania
Gilbert, Cyrus Thurston	Liquor Plumbi Subacetatis Dilutus	Connecticut
Gray, Harry Herman	Milk of Magnesia	Ohio
Gruber, Abraham	Hydrastis Canadensis	Pennsylvania
Guyn, Marion Eugene	Spiritus Ammoniae Aromaticus	Kentucky
Haney, Edward Richard	Potassium Bitartrate	North Carolina
Harnly, Miles Vern	Potassium Ferrocyanide	California
Hartenstein, Earl Stewart, [P. C.]	Liquor Ferri Chloridi	Illinois
Heaton, Harold Johnson	A comparison of Menstrua in the Extraction of Cudbear	Pennsylvania
Heberlig, Wilmer Martin	Repercolation of Fluidextract of Aconite	Pennsylvania
Henry, Ralph A., [Ph.G.]	Manufacture of Paper	Pennsylvania
Hill, Frank Mallory	Extraction of Turpentine from Pine Wood	Michigan

Homerberg, Victor Oliver	Sanguinaria Canadensis	Minnesota
Hutchison, George Barkley	Solution of Hydrogen Dioxide	Kentucky
Irwin, Samuel Maxwell	The Manufacture of Tooth Paste by the Pharmacist	Pennsylvania
Kern, Alvin Henry	Slate	Pennsylvania
Klebanoff, David	Filling Capsules	Russia
LaRue, Raymond Howell	Asafetida	New York
Lehrman, Isador	Digitalis	Pennsylvania
Levi, Gustav Byron	Cataplasma Kaolini	Pennsylvania
McCarty, Harland Adair	Dentifrices	Pennsylvania
Marth, Alfred Robert Franklin	Pancreatinum	Wisconsin
Messimer, Guy William	Anisum	Pennsylvania
Michael, Robert White	Cod Liver Oil	Pennsylvania
Moon, John Arthur	Tablet Triturates and Compressed Tablets	Pennsylvania
Moyer, William Vance	Sulphurated Potassa	Pennsylvania
Mullen, Edward Andrew	Syrupus Hypophositum Compositus	Pennsylvania
Nisley, Lee Armstrong	Dental Wash	Pennsylvania
Nitschke, August Harry	Glycyrrhiza and Glycyrrhizin	Oregon
Osborne, James Edmund	Veratrum Viride	Canada
Peberdy, Grafton Marvin	Extract of Belladonna	Connecticut
Perlman, Henry	Soya Beans	Pennsylvania
Peters, Warren Lucien	Pharmaceutical Sterilization	Pennsylvania
Plunkett, Frederick James	Nitric Acid and Diluted Nitric Acid	N. Hampshire
Rea, Scott Coyle	Tooth Pastes	Pennsylvania
Reichard, William Edward	Liquid Soaps	Pennsylvania
Reinish, Henry Isadore	Ampoules, their Preparation and Uses	Pennsylvania
Ricketts, John Gregory	Liquor Magnesii Citratis	Pennsylvania
Rohn, Miss Herma Alice	Calcii Carbonas	Pennsylvania
Rosenberger, Joseph Mervin	Compound Syrup of the Hypophosphites	Pennsylvania
Ruth, Elton Sunday	Boric Acid Solutions	Pennsylvania
Ruth, Robert Jacob	The Masking of Emulsions	Ohio
Rutter, Lee Deitrich	Gelsemium	Pennsylvania
Samet, Gustav	Courier Oil	Pennsylvania
Sandt, Clarence Lerch	Quinone	Pennsylvania
Seif, Louis Edward	Alum	Wisconsin
Shade, George Washington	Sodium Nitrate	Pennsylvania
Shales, Marvin Asa	Strophanthus	Pennsylvania
Slocum, Fred Williams	Artificial Silk	New Jersey
Smith, Arthur Joseph	Cotton Seed, Products and uses	Pennsylvania
Smith, Fred Merrels	Potassium Bicarbonate	New York
Smith, Stanley Warren	Liquor Potasii Hydroxidi	Pennsylvania

Snyder, Erwin Cleveland	Adulteration of Catechu with Mangrove Extract	Pennsylvania
Southall, James Morton	Elixir of the Phosphates of Iron, Quinine and Strychnine	Alabama
Stevens, Gerald Henry	Embalming Fluids	Pennsylvania
Sutcliffe, John Lewis	Graphite and its uses	Pennsylvania
Taylor, Roy Horton	Tincture of Strophanthus	Pennsylvania
Toplis, William Samuel	Gelatin Capsules for Enteric Use	Pennsylvania
Vogel, John Michael	Cotton Seed	Pennsylvania
Wack, Norman Aloysius	Enteric Capsules	Pennsylvania
Walters, Charles Ellsworth	Liquor Ferri et Ammonii Acetatis	Pennsylvania
Whipple, Ernest Herbert	Bismuth Beta-Napthol	Ohio
Weinberg, David Hanan	Physiological Standardization of Digitalis by means of Frogs	Pennsylvania
West, Hans Peter	Starch	W. Virginia
Witkowski, Leon Francis	Bacterins	Pennsylvania
Wolf, Lawrence Keenportz	Emulsion of Silver Iodide	Pennsylvania
Worley, George Rufus	The Quantitative Estimation of Acidum Phosphoricum U. S. P.	Ohio
Zonies, Nathan	Iodine	Pennsylvania

The following are the names of those graduates who received the degree of Pharmaceutical Chemist (P.C.) together with the subjects of their theses:

Name	Thesis	
Baumgartner, Harry Francis	Syrupus Limonis	Pennsylvania
Blake, William Caleb	The Manufacture of Steel	New Jersey
Buck, William Robert	Oleum Gossypii Seminis	Arkansas
Burwell, Alphonzo Colfax	Emulsions	District of Columbia
Comber, Miss Gertrude Agnes	Magnesium Oxide	Pennsylvania
Clark, Roy Lavender	Antityphoid Vaccination	Utah
Elward, Joseph Francis	Extemporaneous Emulsions	Pennsylvania
Eshenbaugh, Roscoe Russell	The Chemical Characteristics of Linseed Oil	Pennsylvania
Fackenthall, Philip Frederic	Digitalis Seedlings	New Jersey
Fong, Job	Ginseng	China
Goodfriend, Harry Politzer	Silicate of Soda and its Solution	Pennsylvania
Holloway, John Wilson	Greaseless Vanishing Creams	Pennsylvania
Ireland, Oscar Collins	Sugar and its Manufacture	New Jersey

Keller, Frederick Eugene	Liquid Petroleum from Gas	W. Virginia
Keppler, John Fred	Rattlesnake Venom	Pennsylvania
Kinback, Edwin Homer	Glass Graduates	Pennsylvania
McKean, Harold Andrew	The Salt Industry in New York State	New York
Morris, George Thorn	Acetanilidum	Pennsylvania
Russell, Miss Lillian	Magnesii Carbonas	Pennsylvania
White, Charles Albert	Bee Culture and its Products used in Pharmacy	New Jersey

Certificates of Proficiency in Chemistry were awarded the following:

Forman, LeRoy	New Jersey
Jeliff, Glenn E.	Pennsylvania
Moerk, Frank Nicolai	Pennsylvania

The following received certificates of Proficiency in the Food and Drug Course:

Foss, George Rodney	Mississippi
Grantham, Richard I.	North Carolina

The address to the graduating class was made by Hon. William E. Humphrey of Washington.

AWARD OF PRIZES.

The Martin Cup, awarded to the graduation class obtaining a higher average than the one immediately preceding it, was awarded to the class of 1912 and accepted on behalf of the class by their President, Joseph F. Elward, the presentation being made by Dr. R. V. Mattison. The grade of distinguished was obtained by Victor O. Homerberg. The following students attained the grade of meritorious: Ray A. Albeck, Charles H. Brown and John M. Vogel.

The Procter Prize, a gold medal and certificate, for the highest general average of the Class with a meritorious thesis, was awarded to Victor O. Homerberg, the presentation being made by President French.

The William B. Webb Memorial Prize, a gold medal and certificate, offered for the highest general average in the branches of Committee, Operative Pharmacy and Specimens, was awarded to Victor O. Homerberg, the presentation being made by President French. The following graduates received honorable mention in connection therewith: Harry F. Baumgartner, Charles H. Brown, and William V. Moyer.

The Chemistry Prize, $25, offered by Prof. Samuel P. Sadtler, for knowledge of Quantitative Chemical Analysis, was awarded to Victor O. Homerberg.

The Materia Medica Prize, $25, offered by Prof. Clement B. Lowe, for the best examinations in Materia Medica and in recognition of Materia Medica Specimens with a meritorious thesis, was awarded to Victor O. Homerberg. The following graduates received honorable mention in connection therewith: Ray A. Albeck, Walter A. Blasingame, Charles H. Brown, Joseph P. Fox, Harvey Frank, Cyrus T. Gilbert, Miles V. Harnly, Guy W. Messimer, Henry Perlman, James M. Southall, John M. Vogel, and Nathan Zonies.

The Microscopic Research Prize, a compound microscope, offered by Prof. Henry Kraemer, for the most meritorious thesis involving original Microscopic work, was awarded to Victor O. Homerberg. The following graduates received honorable mention in connection therewith: Philip F. Fackenthall, Guy W. Messimer and Erwin C. Snyder.

The Analytical Chemistry Prize, $25, offered by Prof. Frank X. Moerk, for the best work in qualitative and quantitative analysis, was awarded to Victor O. Homerberg. The following graduates received honorable mention in connection therewith: Harry F. Brown, Sylvan L. Foster, Harvey Frank, Arthur J. Smith, Erwin C. Snyder, and John M. Vogel.

The Operative Pharmacy Prize, $20 in gold, offered by Prof. Joseph P. Remington, for the best examination in Operative Pharmacy, was awarded to Roy H. Taylor. The following graduates received honorable mention in connection therewith: Harry F. Baumgartner, Charles H. Brown, Robert P. Dunkle, Russell N. Eberly, Job Fong, Harvey Frank, John M. Vogel and Norman A. Wack.

The Maisch Botany Prize, $20 in gold, offered by Mr. Joseph Jacobs, of Atlanta, Ga., for the best Herbarium Collection of Plants, was awarded to Philip F. Fackenthall. The following graduate received honorable mention in connection therewith: Harry H. Gray.

The Mahlon N. Kline Theoretical Pharmacy Prize, a Troemner Agate Prescription Balance, for the best examination in theory and practice of Pharmacy was awarded to James M. Southall. The following graduates received honorable mention in connection therewith: Ray A. Albeck, West S. Brown, Joseph P. Fox, Harvey Frank, Cyrus T. Gilbert, Victor O. Homerberg and Henry Perlman. The presentation being made by Joseph W. England.

The Commercial Training Prize, $20 in gold, offered by Prof. Joseph P. Remington to the graduate who passed the best examination in Commercial Training at the final examination for the degree, was awarded to Nathan Zonies. The following graduates received honorable mention in connection therewith: Gertrude A. Comber, Philip F. Fackenthall, Harvey Frank, Harold J. Heaton, Samuel M. Irwin, William V. Moyer, August H. Nitschke and Norman A. Wack. The presentation being made by E. Fullerton Cook.

The Instructors' Prize, $20, offered by the Instructors of the College, for the highest term average in the branches of Pharmacy, Chemistry and Materia Medica, was awarded to Cyrus T. Gilbert. The following graduates received honorable mention in connection therewith: Ray A. Albeck, William R. Buck, Frank M. Hill, Guy W. Messimer, John G. Ricketts and Erwin C. Snyder. The presentation being made by Dr. Alfred Heineberg.

The Pharmacy Quiz Prize, one year's membership in the American Pharmaceutical Association, offered by Prof. Charles H. LaWall, for the best term work in Theory and Practice of Pharmacy, was awarded to Cyrus T. Gilbert. The following graduate received honorable mention in connection therewith: Ray A. Albeck.

The Special Lecture Report Prize, $10 in gold, awarded for the best written reports of the series of special lectures held under the auspices of the College, session 1912–1913, was awarded to James M. Southall. The following graduates received honorable mention in conection therewith: Ray A. Albeck, Russell N. Eberly, Cyrus T. Gilbert, Harold J. Heaton, George B. Hutchison, August H. Nitschke and Henry Perlman. The presentation being made by Prof. Chas. H. LaWall.

The Kappa Psi Fraternity Prize, a gold medal, offered by the Eta Chapter of the Kappa Psi Fraternity to the graduate making the highest general average during his or her senior year at the College, was awarded to Victor O. Homerberg. The following graduates received honorable mention in connection therewith: Ray A. Albeck, Charles H. Brown, Philip F. Fackenthall, John G. Ricketts, Erwin C. Snyder and John M. Vogel. The presentation being made by Mr. George Holstein.

The Wellcome Cup awarded to the second year class receiving a higher general average than the class to whom it has been previously awarded was presented on this occasion to the class 1913–1914 and accepted on behalf of the class by Henry B. Decker, the presentation being made by Mr. Walter A. Rumsey.

PHARMACEUTICAL MEETING.

The regular Pharmaceutical Meeting was held on Tuesday, May 20th at 3 o'clock and was taken up by a number of members of the graduating class who presented summaries of their thesis work. Abstracts of these theses will be published in a later issue of this JOURNAL. The following are names of those participating in this symposium: J. F. Elward, P. F. Fackenthall, Harvey Frank, C. T. Gilbert, H. J. Heaton, V. O. Homerberg, S. M. Irwin, J. F. Keppler and S. C. Rea.

James Hugh Allan, of Baltimore, presided. Dr. George B. Weidemann was re-elected Recorder for the meetings for 1913–1914.

GEORGE B. WEIDEMANN,
Recorder.

CURRENT LITERATURE.

A COUNCIL ON PATENT MEDICINES.

The better class of drug journals, in common with the better class of the pharmacists themselves, have long recognized the anomalous position in which the modern druggist stands. On the one hand, the druggist urges physicians to return to rational prescribing and to eschew proprietary products; on the other hand, the druggist himself stands before the medical profession as a dispenser of "patent medicines"—proprietary remedies of the most unscientific and frequently fraudulent type. In commenting on this unfortunate state of affairs, the *Journal of the American Pharmaceutical Association* in its April issue says that the druggist's position has been pressed on him by force of circumstances "in which patent medicines represent his business necessities while the propaganda for rational prescribing represents his aspirations for better things and his strivings for a more professional, as well as a more profitable business." Recognizing that something must be done if pharmacists wish to retain the confidence both of the physician and of the public, and to keep their professional standing, the *Journal* recommends that the American Pharmaceutical Association appoint a council that shall stand in the same relation to "patent medicines" that the Council on Pharmacy and Chemistry of the American Medical Association stands in relation to proprietary medicines. As the drug journal puts it, the work of the council whose creation it suggests should be "to determine first of all whether there is or can be such a thing as a legitimate proprietary medicine ['patent medicine'] which a druggist can conscientiously recommend and sell to the general public, and whether on the whole the public is benefited or injured by the use of such ready-made medicines." If the council decides that there are "patent medicines" which the druggist may recommend and whose sale will benefit the public, its next work would be "to determine whether it is possible to draw a distinct line of demarcation between legitimate and illegitimate remedies. . . ." The growing distrust in the whole "patent medicine" business is such that it behooves our sister profession to rid itself of the stigma which the sale of worthless, and in many cases dangerous, preparations is bringing on an honorable profession. A council such as the editor of the *Journal of the American Pharmaceutical Association* recommends might do much toward this end. If it is brought into existence and does its work thoroughly and honestly, we can with a certain degree of accuracy prophesy what will happen: Some of the most vicious "patent medicines" will be driven off the market. Others less vicious but worthless will have their sales greatly curtailed. As a corollary of this, the American Pharmaceutical Association may expect organized opposition in the form, possibly, of a League for Pharmaceutical Freedom. The *Journal of the American Pharmaceutical Association* will be vilified by many, if not most, of the privately owned drug journals. And last, but not least, the editor of the *Journal* will become the center of an attack in which all the resources of blackguardism and billingsgate will be brought to bear in an attempt to besmirch and blacken his reputation. But the fight will be well worth while.—Reprinted from *Jour. A. Med. Assn.*, May 19, 1913, pp. 1546–1547.

HAARLEM OIL.

A misapprehension in respect to the nature and composition of this ancient proprietary appears to have been prevalent in the trade. The fact that Haarlem oil is essentially a sulphurated linseed oil with turpentine oil, while fully recognized abroad, is disputed here. Three prominent brands, typical, if not of Haarlem oil, then of what is offered for sale in this country as Haarlem oil, have been examined. The importers of each of the three brands stoutly maintain that their article is the only original Haarlem oil and adduce documentary evidence which apparently supports their claims. The prototype is probably lost in antiquity. All that is certain now is that the oil all comes from Holland. It is not even all made in Haarlem, its reputed birthplace. Amsterdam does a thriving business in its manufacture and exportation. The extraordinary literature formerly wrapped around the familiar skin-capped vial has been interdicted by the authorities. Withal, the remedy is certainly the oldest and probably the most widely employed of all "patent" medicines in the world. It is surprising how often one meets a layman who professes the utmost faith in the curative properties of the oil.

Under the general title "Oleum Terebinthinæ sulfuratum" Hager[1] gives the following synonyms of this ancient remedy: "Balsamum sulfuris terebinthinatum; Balsamum Sulfuris Rulandi; Oleum Harlemense; Geschwefeltes Terpentinöl; Schwefelbalsam; Harlemer Balsam; Silberbalsam; Silbertropfen; Balsamsilbertropfen; Tillytropfen; Dutch trops [drops?]." To the remedy itself, which has appeared in the market under each of the above designations, the author assigns the formula:

Sulphurated linseed oil	1 part.
Oil of turpentine	3 parts.

According to the same author,[2] sulphurated linseed oil is prepared by dissolving, with the aid of heat, 100 parts of sulphur in 600 parts of linseed oil. Dieterich[3] confirms the above facts. Buchheister[4] states that "Oleum Terebinthinæ sulfuratum, Harlemer Balsam, H. Oel" is prepared by dissolving, with the aid of heat, 1 part of sulphur in 6 parts of linseed oil, subsequently adding 7 parts linseed oil and 21 parts of turpentine oil. Merck,[5] under the title and subtitles, "Oleum Terebinthinæ sulfuratum, Balsamum sulfuris terebinthinatum, Balsamum sulfuris Rulandii," states that the preparation is a solution of sulphurated linseed oil in oil of turpentine and that it is also dispensed as "Harlemeröl." Hence, the foremost authorities on pharmaceutical practice define Haarlem oil as a solution of sulphurated linseed oil in oil of turpentine. It is true that Hager[6] declares that "Harlemer Balsam" was originally [ursprünglich] made by the dry distillation of 50 parts aloë, 50 parts myrrh, 20 parts olibanum, and 500 parts olive oil. The product was also called "Oleum empyreumaticum Batavicum." But this method of preparation was abandoned long ago, presumably on account of the cost of materials. Certainly the cheapness of Haarlem oil as it now appears in the market is *prima facie* evidence that it is not manufactured by any formula such as that cited above.

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[1] Handbuch der Pharmaceutischen Praxis. 1907, ii, p. 1023.

[2] *Ibidem*, p. 297.

[3] Pharmaceutisches Manual, 1904, pp. 313, 316.

[4] Vorschriftenbuch für Drogisten, 1891, p. 15.

[5] Index, 1902, p. 188.

Now let us consider the physical and chemical properties, as shown by a careful examination in this laboratory, of the three brands mentioned above and referred to as samples A, B, and C.

1. Physical Appearance. A. A viscid liquid of a red-brown color. Odor terebinthinate and somewhat fetid. B. A thin liquid of a dark red-brown color. Odor composite, terebinthinate and amber-like. C. A slightly viscid liquid of a red-brown color. Odor terebinthinate, much finer and sweeter than the other two and reminding of turpentine from *Pinus sylvestris*. Odor of amber oil, subsequently shown to be present, disguised.

2. Specific gravity. Determined in a 50 c.c. pycnometer at 25°. A. 0.9234. B. 0.9082. C. 1.0039.

3. Properties of the portion volatile in steam. 50 c.c. of each sample were distilled with steam, a little NaOH being added to the still to hold back resins, sulphur, etc. A. A nearly colorless oil was obtained. One rectification produced a colorless oil, the properties of which are given below. B. A dark-colored, strongly odorous oil was obtained which had to be thrice rectified before a satisfactory product was obtained. C. Results exactly similar to those obtained with B.

(*a*) Physical appearance. A. A colorless oil, having the true odor of oil of turpentine. B. A light yellow oil, odor terebinthinate, unmistakably empyreumatic and characteristic of amber oil. C. A yellow oil, odor terebinthinate, unmistakably empyreumatic and highly characteristic of amber oil.

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[6] Handbuch der Pharmaceutischen Praxis, 1907, II, p. 502.

(*b*) Specific gravity. Determined in a Sprengel tube at 25°. A. 0.8648. B. 0.8625. C. 0.8749.

(*c*) Optical rotation. A. + 10° 49′. B. — 8° 36′. C. — 6° 31′.

(*d*) Solubility. A and B formed clear solutions with 2 to 10 vols. 95 per cent. alcohol. C formed a clear solution with 1 to 10 vols. 95 per cent. alcohol.

(*e*) Petroleum. Hydrocarbons of the paraffin series were proved absent by the fuming nitric acid test[7] in each of the oils.

(*f*) Turpentine. The presence of turpentine in all three oils was demonstrated by the preparation of pinene nitrosochloride.

4. Petroleum in the original oil. Samples A and C were tested for petroleum products by the fuming nitric acid test.[8] Sample A. The burette method was tried twice, but the reaction could not be completed owing to the dense froth produced which persisted in going out the top of the burette. The experiment was then done in a shallow porcelain dish, using 40 c.c. of fuming nitric acid and 10 c.c. of the oil. After the reaction was complete, the liquid was poured into a burette. Result: light red-brown, clear liquid, no oily separation at surface. Sample C. It proved to be practicable to handle this sample in a burette. Result: deep red-brown liquid, holding in suspension resinous particles, but no oily separation at surface. These experiments proved the absence of hydrocarbons of the paraffin series (petroleum, kerosene, etc.).

5. Presence of sulphur. A finely powdered, intimate admixture of anhydrous sodium carbonate, 40 gms., potassium nitrate, 80 gms., and pure, dry sodium chloride,[9] 240 gms., was prepared by prolonged trituration in a mortar. Half a cubic centimeter of the Haarlem oil was put into a 15 c.c. porcelain crucible, provided with a cover, 10 gms. of the above mixture of salts were added, the crucible was covered and heated at 120° over night. Then the temperature was raised gradually until the mass was in a state of quiet fusion. After cooling, the mass was extracted with boiling water, the solution filtered, the filtrate evaporated to dryness, the residue brought to complete dryness repeatedly in the presence of HCl in order to expel HNO_3, then dissolved in boiling water and again

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[7] Annual Report of Lehn & Fink's Analytical Department for 1909, p. 26.

[8] *Ibid.*

[9] Table salt is never pure enough for analytical use. It usually contains a considerable percentage of SO_4.

filtered. To the hot filtrate barium chloride solution was added. Three separate experiments on each of the Haarlem oils under examination gave immediate, decided precipitates, which were insoluble in excess of HCl. Two blank experiments, carried out in exactly the same manner, except, of course, for the omission of the Haarlem oil, yielded no precipitates, thus demonstrating the purity of the reagents. The presence of sulphur is further evidenced by a fetid ódor, more or less disguised, in all Haarlem oils.

6. Summary. The above data indicated that A consisted of sulphurated oil and oil of turpentine; that B and C consisted of sulphurated oil, oil of turpentine, and crude oil of amber, the last named being present in greater proportion in C than in B.—From Report of Lehn and Fink's Analytical Department, 1910–1912.

ARTIFICIAL MENTHOL.

The extremely low prices at which certain parcels of menthol have been offered in Hamburg at first suggested adulteration; the melting point, 37°–38° C. and 36.5°–38°; also the optical rotation, *ad* — 42.10° and 46.38° indicating that the samples were "abnormal." Further examination failed, however, to reveal the presence of any foreign addition, and analysis showed that the content of alcohols of the formula $C_{10}H_{20}O$ was 100 per cent. It is considered, therefore, that the menthol in question contained the stereo-isomeric menthols such as can be obtained easily by the reduction of menthone or of pulegone. Except in the British Pharmacopœia, 1898, which expressly states that menthol should be derived by cooling the oil of *Mentha arvensis* and of *Mentha piperita* there is no statement in any pharmacopœia which will preclude chemically-prepared menthol from use in medicine. In fact, in the French Codex, 1908, it is definitely stated that menthol is "also produced by reducing with hydrogen the corresponding *a*-ketone occurring in Japanese peppermint oil." (The British Pharmacopœia gives the melting-point of menthol as 42° C. and not exceeding 43° C. The French Codex requires it to melt at 43° C.—E. Tedesko, *Apoth. Zeit.*, 1913, 28, 312.) T. W. ENGLAND.

JAPAN PEPPERMINT.

We enlisted the services of our good friend, Mr. J. Perez Henrique, representing the firm of Muhlethaler & Co., who was paying a visit to Japan, to obtain for us a specimen of the peppermint plant now being cultivated in Okayama in Japan, and which is stated to produce the best peppermint oil. The sample has now come to hand, and, although the foliage is somewhat broken and it is not easy of identification, yet we have every reason to believe that it is not the variety that has hitherto been sent from Japan, but that it is in all probability the Chinese form, *Mentha Canadensis,* var. *glabrata.* To this we shall refer subsequently, however, and in the meantime we are promised also specimens of the mint plant as cultivated in Hokkaido.

We are sanguine that the identification of these plants may show that the varieties now being cultivated are different to those which were formerly distilled, and that in this way one may account for the difference in the constitution of the essential oil. (See *Perfumery and Essential Oil Record,* February, 1913, pp. 32–33.)—*Perfumery and Essential Oil Record,* May, 1913, p. 118.

T. W. England.

NOTES AND NEWS.

British Medal for American Research Worker.—The Hanbury medal of the Pharmaceutical Society has been awarded to Dr. Frederick Belding Power, Ph.D., LL.D. The medal is awarded biennially for excellence in the prosecution or promotion of original research in the chemistry and natural history of drugs, and the adjudicators are the presidents of the Linnean, Chemical, and Pharmaceutical Societies, and of the British Pharmaceutical Conference, together with one pharmaceutical chemist (who on the present occasion was Mr. Edmund White, vice-president of the Pharmaceutical Society), nominated by the last-named two presidents.

Dr. Power, who is a director of the Wellcome Research Laboratories, is an American by birth. He was a student at Strasburg University, where he received the degree of Doctor of Philosophy, and was assistant to the late Professor Flückiger. For the greater part of his career Dr. Power has been engaged in the investigation of drugs, and during the last seventeen years has written 150 scientific memoirs, embodying the results of his researches.—Extract from the *Times* dated May 20, 1913.

THE AMERICAN
JOURNAL OF PHARMACY

JULY, 1913

BREEDING MEDICINAL PLANTS.*

By F. A. Miller, B.S.

The products from medicinal plants are without doubt as valuable to mankind as those from the cereal, vegetable, fruit, flower, fibre and other economic plants under cultivation. The latter have all yielded to the principles of plant breeding, and have supplied man with a wealth and variety of products which nature's laboratory has never equalled. Why should not medicinal plants yield and produce in a similar manner, and through cultivation and improvement be made to furnish mankind with more efficient remedies against disease?

An examination of the crude vegetable drugs as they occur on the drug markets of to-day reveals a mass of inferior materials far in excess of what might be expected. Much of this material is unfit for manufacturing purposes, through adulteration with unknown and worthless admixtures, partial or complete substitution of one plant or plant part for another, old, inert, mouldy drugs which may have been stored under adverse conditions or collected out of season and improperly cured and packed. All this is due to a lack of power to control the production of crude vegetable drugs. Too much must be left to nature or to none too well informed collectors. The faults and inefficiencies of nature need little comment. A comparison of a few improved varieties with their wild ancestors is sufficient evidence that nature is poorly equipped for the production of improved strains.

Ignorant collectors many times are a menace. Personal experience with many of them has revealed an absence of any sense of responsibility, and but little power of discrimination in selecting and identifying plants. They cannot separate closely related species, a procedure often necessary in the intelligent collection of medicinal plants, and frankly refuse to observe certain rules governing collection and curing. It is thus evident that the variations of nature associated with ignorance, often give the pharmacist and practicing physician a poor and suspicious product. Rigid inspections must be enforced at all stages in the process of manufacturing medicinal preparations. But however rigid these inspections may be, they cannot overcome all the variations of plant growth or correct all the mistakes of careless collectors. The supply of medicinal plant products should be controlled with the same degree of nicety as the agricultural products or even with greater precision, since in many instances a life is dependent upon the strength and purity of some vegetable drug.

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* Read before the Plant Section of the American Breeders' Association at the meeting held in Columbia, South Carolina, January 25, 1913.

Plant breeders are supplying fruits of varying acid values, corn of high and low percentage of oil and protein, carefully selected sugar beets of high yielding power, and varieties of tobacco suitable for various purposes according to an indicated nicotine content. All of these achievements and numerous others are noteworthy. Of a different character, but of no less importance are the drug producing plants which yield the alkaloids, glucosides, saponins, resins, oleoresins, etc., upon which their curative property depends. Cannot the plants yielding these so-called active principles be brought under the influence and control of the breeder, and be made to produce their respective products more abundantly and more consistently than in the wild state? In attempting to answer this question, experiments have been started with several medicinal plants which will extend over a considerable period of time, and involve various problems of selection and breeding.

The *Solanaceæ* offer as rich a field in the development of improved medicinal forms as it has already offered in the production of the potato, tomato, egg plant and capsicum among the food producing plants, and the datura, solanum, capsicum and tobacco of the decorative forms. In the terminology of the druggist there is found within the same family the very important form, belladonna, henbane and stramonium, all yielding alkaloids and readily amenable to chemical methods of assay. These three genera, in addition to others from different plant families, are being used in the above mentioned experiments. Chemical and biological methods are being used in checking and following the progress of the work. It is hoped that correlations may be found to exist between high potency and certain morphological characters. This would eliminate in part at least the chemical and physiological assays, which are expensive, and somewhat long. Following is a brief discussion of what is being done with some of the forms under investigation.

BELLADONNA.

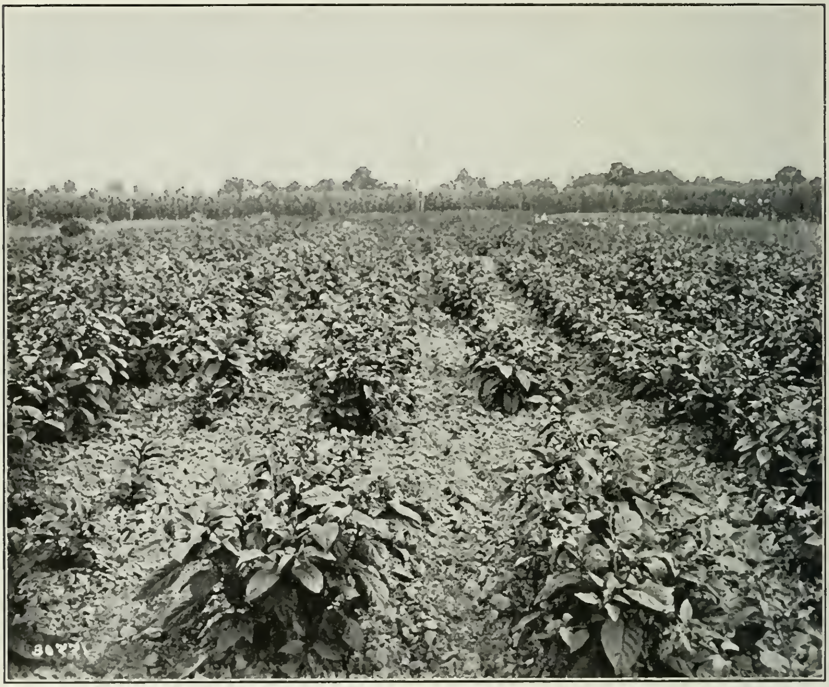
Both the leaves and roots of belladonna (*Atropa belladonna*) are used. They must yield respectively 0.30 per cent. and 0.45 per cent. of alkaloids. During the past three years, 6 per cent. of all shipments of the leaf examined were below standard. The variation in percentage of alkaloids for the same period of time was from 0.23 to 0.62 per cent., average 0.43 per cent. Of the shipments of root examined, 28 per cent. were below standard, with a variation of from 0.17 to 0.66 per cent., average 0.48 per cent. No attempts have been made to breed belladonna for a high yield of alkaloids, a possibility which is suggested by the range of variations as indicated above. That the belladonna plant does possess a higher yielding power than average figures would suggest, is shown by a yield of 0.9 per cent. of alkaloids which was obtained upon a plot fertilized with commercial acid phosphate. Such a high yielding power as this would of course not be transmitted by these plants to their offsprings. It is only mentioned to indicate the possibilities of locating high yielding plants by testing leaves from selected individuals.

During the past summer a number of such selections were made. Individual plants were selected, numbered and inbred. Samples of leaves were taken from these individuals upon which to determine the alkaloidal yield. These selected plants were also propagated vegetatively and the resulting plants are being grown in the greenhouse. Some of them are growing in pots in the original soil in which the parent plants were grown, while others are growing in various mixtures of widely differing soils. In this manner it is hoped that some information may be gained upon the behavior of the alkaloids with respect to inheritance, effects of soils, variation in yield from plants grown from open pollinated and close fertilized seeds; and from those propagated by cuttings.

The selected plants so far tested indicate a variation in yield of from 0.55 per cent. to 0.87 per cent. of alkaloids. The progeny of these plants of known yield will be tested in a similar manner.

The external characters of the belladonna plant are extremely uniform, with the exception of total yield of leaves and roots per plant. This exception will be taken advantage of in selecting for increased production of these products. Individuals vary in amount of dry root produced from 139 grams to 203 grams. It has been stated that the percentage of alkaloids in the roots of this plant increase markedly after the first year, and reach a maximum at the end of the third year's growth. Belladonna is not perfectly hardy throughout the central United States, and more hardy strains must be developed before the above condition can be observed to advantage. Sixteen hundred plants are now being tested

Fig. 1.



Commercial test plot of Belladonna.

in the vicinity of Indianapolis for relative hardiness. See Figure I for test plot of belladonna.

HENBANE.

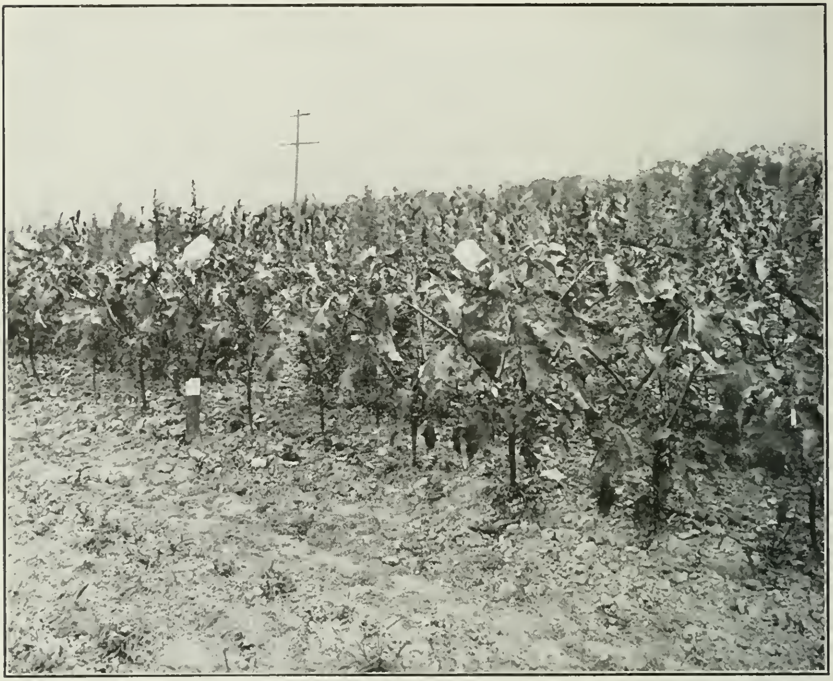
Henbane is a pharmacopœial drug, supposed to consist of the dried leaves and flowering tops of *Hyoscyamus niger* collected from plants of the second year's growth. This product must yield not less than 0.08 per cent. of alkaloids. Records covering one hundred and two inspections of this drug purchased in the drug markets of the United States, show but thirteen per cent. with a yield of alkaloids equal to or above this requirement. The remaining eighty-seven per cent. vary from 0.018 per cent. to 0.075 per cent. From a botanical point of view, this drug is also far from uniform. Many samples and shipments contain seeds which germinate readily, and when grown to maturity, furnish a means of accurately identifying the original material. A number of shipments have been checked in this manner during the past two years, and annual plants have been found in nearly all cases. The official requirements state definitely that the drug must be collected from plants of the second year's growth. However, without some provision for controlling this collection, little can be done toward obtaining an official product in this respect. Certainly the above conditions of alkaloidal yield and botanical origin of this drug are strongly suggestive of the necessity and desirability of subjecting the genus to a thorough and rigid investigation. This investigation should have to do with the isolation and cultivation of the annual and biennial forms, as well as all species and varieties of these. Individual plants should be selected for breeding purposes, and tested for yielding properties in the same manner as described for belladonna.

STRAMONIUM.

Stramonium has been taken up in a similar manner, and the work on *Datura stramonium* and *Datura tatula,* two common forms, has now been carried through the second year. Selections of *Datura tatula* gave a variation in alkaloidal percentage of from 0.47 to 0.65. The plants yielding these extremes produced offsprings as follows:

Of ten individuals from the plant yielding 0.47 per cent. alkaloids, a range of from 0.44 per cent. to 0.57 per cent. was obtained, the average for the ten being 0.51 per cent. Of the same number of individuals from the plant yielding 0.65 per cent., a range of from 0.43 per cent. to 0.77 per cent. was obtained, the average in this case being 0.65 per cent. In the first group seven of the ten plants tested exceeded the parent in alkaloidal yield, while in the second, only five exceeded the parent. It is of interest to note that the lowest limit (0.43 per cent.) was found in the progeny of the high yielding plant (0.65 per cent.), the lowest limit in that of the low yielding plant (0.47 per cent.) being 0.44 per cent. The most promising feature of this experiment in its present stage is the greater average yield obtained over that from wild plants from the same locality. A mixed sample of leaves from uncultivated plants of *Datura tatula* gave a yield of only 0.35 per cent. in comparison with average yields of 0.51 and 0.65 per cent. from selected plants. These latter figures might also be compared with

Fig. 11.



Breeding plot of Stramonium.

the average yield of commercial shipments of stramonium as noted for three years, which is 0.34 per cent. The analysis of the *Datura stramonium* selections of the past year, which were performed in the same manner as those of *Datura tatula,* have not been completed. The parent plants, however, from which these selections were made, gave yields of 0.46 per cent. and 0.55 per cent. respectively, which figures represent the low and high limits obtained from a number of individuals.

Two other varieties of stramonium not common to this country were grown and tested. These were *Datura humulis flava,* bearing large, beautiful, double yellow flowers of peculiar fragrance, and *Datura ferox,* a form very closely resembling *Datura tatula,* but having a more vigorous and robust habit. Both of these forms were obtained from Germany. The first contained in a mixed sample, 0.42 per cent. of alkaloids, and individual selections of the second gave a variation of from 0.53 per cent. to 0.70 per cent. of alkaloids.

It is to be regretted that none of the first plants selected for testing were close fertilized. During the past year, all selected plants were inbred, and only these will be used in continuing the work. Twenty crosses were made among the three species, stramonium, tatula and ferox. The effects of these crosses upon alkaloidal yield as well as upon visible characters, will be noted during the next growing season. See Figure II for breeding plot of stramonium.

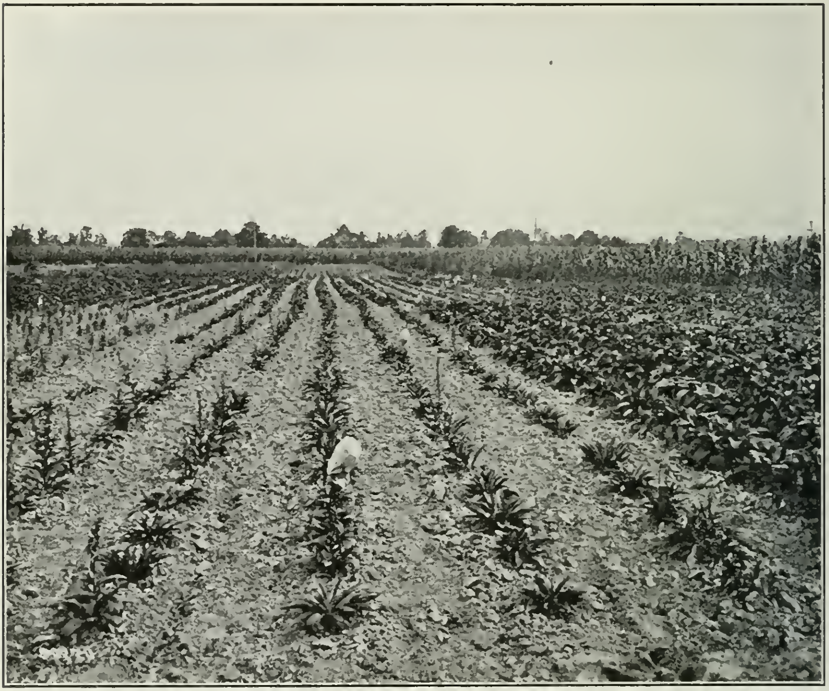
DIGITALIS (Foxglove).

Digitalis, the common garden foxglove, has been chosen as another medicinal plant upon which to test the effects of breeding. It is also an official drug, and must consist of the leaves from the second year plant of *Digitalis purpurea* at the commencement of flowering. This form has been included for experimental purposes on account of its value to the physician and because of a wide variation and much uncertainty in physiological effect. There is also a lack of experimental data upon such questions as the comparative value of the wild and cultivated plant and of the many different species and varieties, of the effects of cultivation upon medicinal value, time of collection, methods of curing, packing and storing and of the influence of various ecological factors.

In the study of the group, it is not only desirous to compare the many species and varieties medicinally, but also to determine their relative yield of crude material, ease of culture, hardiness, flowering period and effects of hybridization upon these respective characters.

Thirty-two forms (see Figure III) consisting of both species and varieties, are under observation. These have been started from seed purchased of commercial seedsmen. The most prominent trade catalogues from this country, England, Germany and Japan have been examined, and all forms of the foxglove listed in them have been obtained. Some of these were started in the greenhouse as early as December in an effort to bring as many of them as possible into flower the first year. The following table shows the date planted, number of plants in flower on given dates, and total number of plants, both flowering and non-flowering, at end of growing season:

FIG. III.



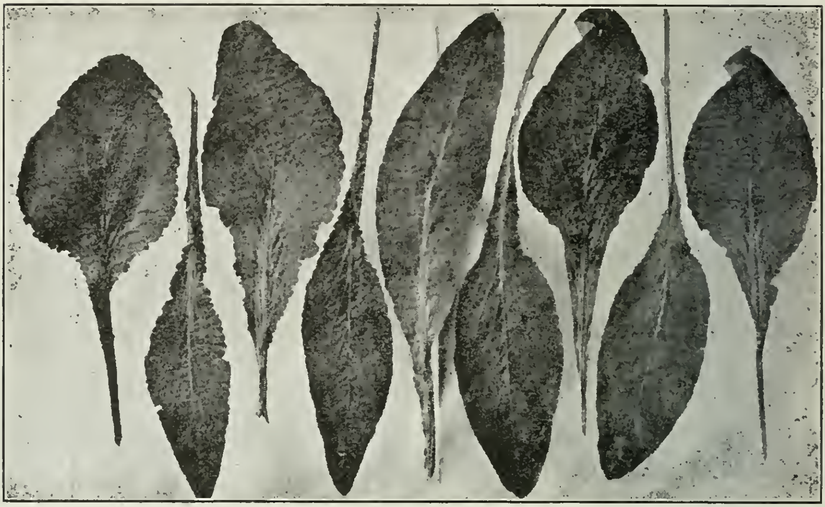
Various species and varieties of Digitalis.

DATES OF FLOWERING AND NUMBER OF PLANTS IN FLOWER.

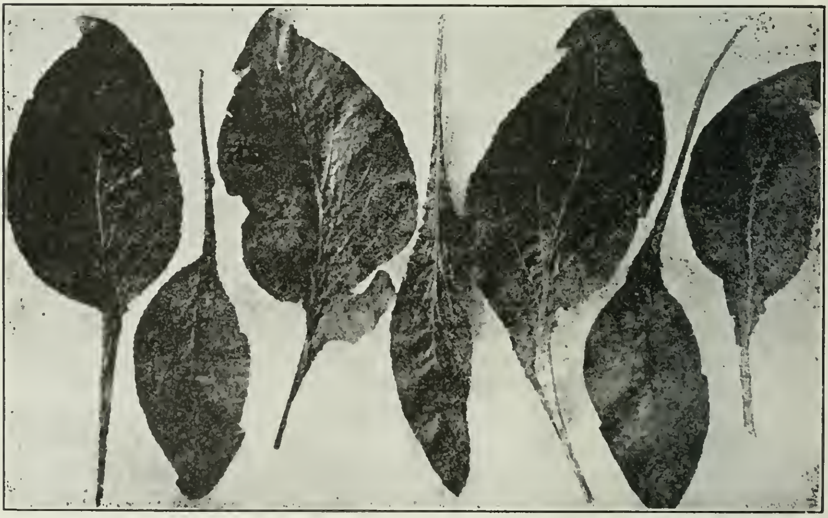
Variety.	Source.	Date Planted.	July 15.	July 20.	July 25.	July 30.	Aug. 10.	Aug. 20.	Sept. 1.	Sept. 20.	Oct. 15.	Number Plants Used.
Digitalis lanata...	Horsford, Vt.	12/20–11	..	..	..	..	..	1	...	2	2	97
Digitalis ambigua..	Horsford, Vt.	12/21–11	1	17	35	49	54	87	151	217	220	233
Digitalis canariensis............	Watkins & Simpson, London	1/4 –12	..	..	..	..	..	..	..	..	2	224
Digitalis gloxiniæflora lutea......	Boddington, N. Y.	1/30–12	..	1	1	..	..	3	11	68	95	386
Digitalis purpurea rosea..........	Boddington, N. Y.	2/ 6–12	..	..	..	..	..	1	..	..	..	358
Digitalis purpurea alba...........	Boddington, N. Y.	2/ 6–12	..	..	...	..	1	..	..	..	..	334
Digitalis gloxinioides............	Horsford, Vt.	2/ 7–12	..	..	..	..	4	..	5	9	10	383
Digitalis monstrosa	Watkins & Simpson, London	2/ 7–12	..	..	..	..	1	2	..	..	2	349
Digitalis grandiflora..........	Dreer, Philadelphia	2/ 7–12	..	1	2	..	5	32	113	189	239	240
Digitalis sibirica...	Horsford, Vt.	2/ 8–12	..	..	..	..	..	..	..	6	20	294
Digitalis ivery's spotted........	Ferry, Mich.	2/29–12	..	..	..	..	..	..	..	..	1	244
Digitalis sp.......	Yokohama, Japan	3/ 5–12	..	..	..	..	..	..	..	..	5	239
Digitalis macranthus..........	Benary, Germany	3/22–12	..	2	3	..	16	81	161	217	222	231
Digitalis lutea....	Benary, Germany	3/22–12	..	..	..	..	..	..	..	1	3	256
Digitalis buxbaumi	Benary, Germany	3/22–12	..	..	..	..	..	..	1	7	25	319

FIG. IV.

LEAF VARIATIONS IN DIFFERENT PLANTS OF THE SAME SPECIES OR VARIETY. A TYPICAL MATURE LEAF WAS COLLECTED FROM EACH PLANT.



Digitalis purpurea. Watkins and Simpson, London.



Digitalis gloxinioides. Horsford's Nurseries, Vt.

The early flowering individuals noted in the table are being utilized for breeding purposes, in the hope of obtaining either annuals or biennials of a higher and more uniform quality. Mixed samples of leaves collected from plants of the first year's growth of all varieties studied have been biologically tested. Many of the varieties test equally as high as good commercial drug, and some of them even exceed this article in relative strength, as indicated by the above method. Others have proven extremely inactive, the poorest, as indicated by the physiological tests, being only one-sixth as active as the best.

In addition to the biological tests, the external characters must also be closely observed. Upon a basis of leaf forms, the genus is easily divided into two groups. One of these is characterized by broad, rough leaves and includes such varieties as purpurea, monstrosa, alba, gloxinioides and others. They vary greatly in physical characters, and apparently hybridize with considerable ease. The other group is characterized by narrow, smooth leaves and includes such forms as *lanata, ambigua, grandiflora, sibirica, canariensis* and others. The members of this group vary little in external characters, and hybridize with considerable difficulty.

The diversity of leaf forms, as noted for individuals of the same species or variety, is indicated for two forms, in Figure IV. Each leaf was taken from a different plant. The variations in size, shape, margin, petiole, surface and color seem too great and diversified to be explained as individual variabilities. Breeding and the examination of a large number of plants will evidently clear up this point.

The foregoing is only expected to serve as a suggestion to those who may be interested or have the opportunity to observe or investigate medicinal plants. Much good will have resulted if better crude drugs of vegetable origin can be produced from the wild forms, by an application of the rapidly advancing views of the practical breeder. It is only just that the demands upon the plant kingdom should be exhausting, and such will not be the case until medicinal plants are included in the category of the plant breeder.

Botanical Department, Eli Lilly & Company,
Indianapolis, Indiana, January 18, 1913.

MAGMA MAGNESIÆ.[1]

By George M. Beringer.

The National Formulary directs that Magnesia Magma, commonly called Milk of Magnesia, be made by pouring a filtered solution of 81 Gm. of Sodium Hydroxide in 4000 cc. of Water into a filtered solution of 250 Gm. of Magnesium Sulphate in 4000 cc. of Water. The precipitate is washed by decantation, then drained and mixed with sufficient water to make the product measure 1000 cc.

This looks like an exceedingly simple formula that should yield a satisfactory preparation. However, in my experience, it has not proven so, and several modifications are necessary and are included in the improved formula now presented.

The author of the N. F. formula aimed to obtain a very fine precipitate by using very dilute solutions and precipitating at room temperature. He succeeded in doing this, but the precipitate is so light and commonly so bulky that it is with difficulty that it can be reduced to a volume of 1000 cc. and remain sufficiently fluid to pour. The resulting magma usually resembles thick starch paste.

An examination of the wash water shows that the Magnesium is not all precipitated. This is readily understood when the formula is critically examined. The quantity of Sodium Hydroxide directed, 81 Gm., is shown by calculation to be the theoretical amount of pure anhydrous Sodium Hydroxide that would be required to react with 250 Gm. of Magnesium Sulphate, U. S. P., but as Sodium Hydroxide, U. S. P. contains about 90 per cent. pure NaHO, it is self-evident that the formula directs an insufficient amount.

The chemist has been taught the difficulty of completely precipitating Magnesium Hydroxide in the presence of alkaline chlorides or sulphates and that an excess of the solution of potassa or solution of soda is necessary and that "the separation of this precipitate is greatly promoted by boiling the mixture." The present N. F. formula has insufficient alkali instead of an excess, and, moreover, commits a manipulative error in directing that the Sodium Hydroxide solution be poured into the solution Magnesium Sulphate so that at no time is an excess of alkali present. The use of hot solutions instead of cold should also be directed.

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[1] Read at the annual meeting of the New Jersey Pharmaceutical Association, June 11, 1913.

To correct these defects, the following improved formula is presented:

MAGMA MAGNESIÆ.

Magnesium Sulphate	250 Gm.
Sodium Hydroxide	100 Gm.
Water, a sufficient quantity.	

Dissolve the Sodium Hydroxide in 1000 cc. of Water and the Magnesium Sulphate in another portion of 1000 cc. of Water and filter the solutions. Heat the solutions to boiling and add the Magnesium Sulphate to the solution of Sodium Hydroxide with constant stirring. Boil the mixture for fifteen minutes, then remove from the fire and wash several times by decantation and then on a close muslin strainer until the washings are free from saline taste and give not more than a slight turbidity with Barium Chloride T.S. Allow the magma to drain, then transfer to a suitable vessel and add sufficient water to make 1000 cc. and mix thoroughly.

In order to obtain a nice white and smooth preparation, one must be careful of the character of the water used. If distilled water is produced in abundance and at a minimum cost it can be used to advantage. The cost of distilled water to the average pharmacist, however, would preclude its use for the washing of this preparation. Satisfactory water can be cheaply and readily obtained by adding 5 Gm. of powdered Magnesium Carbonate to each litre, boiling and then filtering.

ELIXIR FERRI, QUININÆ ET STRYCHNINÆ PHOSPHATUM.[1]

By George M. Beringer.

The formula for the Elixir of the Phosphates of Iron, Quinine and Strychnine, U. S. P. VIII, has been criticized largely because of the uncertainty of the color in different lots and the rapid changes that take place in the color and flavoring on keeping. Recently, another question has been raised, namely, if Quinine in solution with Acetic Acid is not partly changed to Quinotoxin. Consequently, it seems desirable to adopt in the revision a different formula.

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[1] Read at the annual meeting of the New Jersey Pharmaceutical Association, June 11, 1913.

The pharmaceutical journals have presented a number of proposed formulas and it has fallen to my lot to try many of these. Without going into a detailed account of the experiments or criticism of these formulas, I will submit the improved formula which I have recommended.

ELIXIR FERRI, QUININÆ ET STRYCHNINÆ PHOSPHATUM.

Soluble Ferric Phosphate	17.5	gm.
Potassium Citrate	5	gm.
Quinine	8.75	gm.
Strychnine	0.275	gm.
Phosphoric Acid	2	cc.
Alcohol	200	cc.
Glycerin	200	cc.
Compound Spirit of Orange	10	cc.
Purified Talc	30	gm.
Distilled Water, a sufficient quantity,	——	
To make	1000	cc.

Dissolve the Quinine and the Strychnine in the Alcohol and 100 cc. of Distilled Water to which has been added the Phosphoric Acid. Add to this the Compound Spirit of Orange. Dissolve the Soluble Ferric Phosphate and the Potassium Citrate in 100 cc. of warm Distilled Water. To this solution add the Glycerine and then the alkaloidal solution and sufficient Distilled Water to make the product measure 1000 cc. Mix the Purified Talc intimately with the liquid and then filter, returning the first portion of the filtrate until a transparent liquid is obtained. Lastly, wash the filter with a mixture of 1 volume of Alcohol and 4 volumes of Water until the filtered product measures 1000 cc.

In this formula the proportion of the medicinal ingredients is retained the same as in the present official formula, as it was not deemed desirable to make any change in the accepted strength or dosage. The use of glycerin as the sweetening ingredient in place of sugar has proven very satisfactory in elixirs containing iron salts and corrects the tendency of such elixirs to change color. The green tint of the product as at first prepared appears to undergo no marked change after keeping for a year or more. Instead of using Aromatic Elixir as a diluent, the elixir is made in the process of the manipulation, the Compound Spirit of Orange being added, thus insuring the greatest amount of flavoring possible. The manipulation is an important factor in obtaining a satisfactory product and a reversal of the directions as to mixing will promptly demonstrate this.

DEODORIZED TINCTURE OF OPIUM.[1]

By Joseph W. England.

The official Deodorized Tincture of Opium is a solution of the water-soluble proximate principles of opium made from granulated opium and water, concentrated by evaporation on a water bath, washed with purified petroleum benzin and preserved with alcohol. The process eliminates resin, caoutchouc, ligneous matter, odorous principles, etc. The preparation is analogous to the old McMunn's Elixir of Opium.

The objection to the official method of making Deodorized Tincture of Opium is that it is tedious to carry out and the product, unless very carefully made, is apt to have a benzin-odor.

Various improvements in the official formula, including the paraffin-method, have been suggested, but the simplest and best procedure, in the judgment of the writer, is to make the preparation directly from deodorized opium, as advocated by the late Professor John M. Maisch (King's American Dispensatory, 1900, p. 1978). This has been done in the laboratory of Smith, Kline and French Co., for a number of years and with entire satisfaction.

The following method is recommended:

Deodorized Opium (containing 12 to 12.5 per cent. of crystallizable morphine) one hundred grammes	100 gms.
Alcohol, two hundred cubic centimeters	200 cc.
Water, a sufficient quantity to make one thousand cubic centimeters	1000 cc.

To one thousand cubic centimetres of *cool* water, in an evaporating dish, gradually add one hundred grammes of Deodorized Opium, mix and heat on a water bath for six hours; replacing water lost by evaporation. When cool, pour the mixture, as evenly as possible, upon a wetted, non-fluted paper filter in a funnel, returning the first portion of the percolate until it runs clear. Then percolate the residue on the filter with water until the percolate passes colorless and is only faintly bitter. Concentrate the percolates on a water bath, until they measure seven hundred cubic centimetres, cool, add two hundred cubic centimetres of alcohol, and filter through a paper filter.

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[1] Presented at the annual meeting of the New Jersey Pharmaceutical Association, June 11, 1913.

Assay the final product by the process given under Tinctura Opii of the U. S. Pharmacopœia and adjust the volume of preparation, by the addition of water, so that each one hundred cubic centimetres shall yield not less than 1.2 nor more than 1.25 Gms. of crystallized morphine. By making the final volume nine hundred cubic centimetres, and assaying, the product can be most readily standardized.

In the making of Deodorized Tincture of Opium from deodorized opium, boiling water has been used, but, in the writer's opinion, the use of *cool* water, and then heating on a water bath, is preferable.

PHYLACOGENS.[1]

General Description.

Since 1910 the interest of medical circles has been excited by the extraordinary results reported as following the use of a new form of bacterial derivative in the treatment of acute and chronic infections, originated by Dr. A. F. Schafer, of Bakersfield, California, who first presented his discovery to the profession through the San Joaquin Medical Society, at Fresno, California, October, 1910, and later through the San Francisco Medical Society on January 14, 1911. Dr. Schafer's preliminary paper was published in the *Therapeutic Gazette,* April 15, 1911.

Theory: The Views of Dr. Schafer.

The principle upon which the use of these Phylacogens is founded is, briefly, the theory of multiple infections. The principle is supported by an extraordinary practical experience, supplemented by exhaustive and long-continued laboratory and clinical experimental work by Dr. Schafer.

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[1] In response to a request by the editor of this Journal for a brief article giving a summary of the nature, properties and uses of Phylacogens, Messrs. Parke, Davis and Company have sent a voluminous article of which this is an abstract.

Three facts are set forth by Dr. Schafer as the basis of this new therapy.

First: Practically all acute and many of the chronic diseases are caused by the metabolic products of pathogenic bacteria.

Second: The human subject is the host of micro-organisms that are pathologically latent but capable of setting up a disease process under certain conditions.

Third: The growth of infecting micro-organisms can be arrested and their effects neutralized by products derived from their development in artificial culture media.

Dr. Schafer is of the belief that all infections are "mixed infections," that except in rare instances there is no such thing as an infection by a single species of micro-organism; that while one species may predominate, the pathogenic process engendered by it is accelerated and intensified by the complicating presence of other organisms of other species: in other words, that in the course of an infectious disease the symptoms are due not only to the effects of a single species of organism (the specific infection), but to the influence of other organisms whose pathologic role is not insignificant, but which must be reckoned with in any successful scheme of therapeutics.

Dr. Schafer further believes that the human subject is at all times the host of a great variety of organisms and harbors these pathogenic bacteria without harm to itself during periods of physiological resistance, at or above par, and in the absence of any solution of tissue continuity. When the resistance is below par, or a solution of continuity of tissue occurs, the bacteria harbored by the human host assume pathological significance.

Furthermore, he contends that certain diseases, as typhoid fever, pneumonia, tuberculosis, erysipelas, rheumatism, and others, are objective and subjective symptomatic manifestations of the preponderance in the patient of the toxic and destructive products of the peculiar species of organisms to which the etiology of the disease is usually ascribed, as *B. Typhosus* in typhoid fever, *D. Pneumoniæ* in pneumonia, the *B. Tuberculosis* in tuberculosis, etc.; and, in addition, the symptoms are due in part at least to the destructive action of certain materials produced by complicating organisms which are always present in great variety and number.

As an illustration, attention may be directed to the now commonly accepted idea that in pulmonary tuberculosis the greatest danger to the patient, much of the difficulty of the treatment, and many of the most notable symptoms, such as loss of weight, high temperature, disturbance of circulation, purulent expectoration, destruction of tissue, etc., are due to the complicating organisms, and if the so-called "mixed infection" can be checked or eliminated, efforts may be directed against the bacillus tuberculosis with far greater success than has heretofore been possible in the treatment of this condition.

Dr. Schafer points to the fact that the administration of bacterial vaccines to patients suffering from infection not infrequently fails of effect because the truth of the above assumption is not recognized, especially when the treatment consists in the use of a vaccine made from a single species of organism isolated from the patient. Bacterial vaccines made from a single species of organism proved successful in many cases, but the multiplicity of "combined" bacterial vaccines now in use points to the rapidly developing conclusion that the great majority of patients require something more than treatment with a vaccine made from one organism; the success attending the use of polyvalent bacterial vaccines made from a number of different species, even when used in pathologic conditions apparently due to one species, points to the likelihood of this theory being correct.

NAME.

The term "Phylacogen" has been coined to distinguish the several new bacterial derivatives (devised by Dr. A. F. Schafer and produced by Parke Davis & Co.) from other remedial agents of similar character that may be offered to the medical profession. Each specific Phylacogen is further identified by the prefixion of the name of the pathological condition in which it is indicated—as Gonorrhea Phylacogen, Rheumatism Phylacogen, Pneumonia Phylacogen, etc.

The term "Phylacogen" (derived from two Greek words, phulax φύλαξ a guard, and gennan τενναν to produce) means "Phylaxin producer." Phylaxin is the name applied by Hankin to a defensive proteid found in animals that have acquired an artificial immunity to a given infectious disease. Phylacogens are new process bacterial derivatives prepared by Parke, Davis & Company according to a method originated by Dr. A. F. Schafer and used in the treatment of infectious diseases.

PREPARATION OF PHYLACOGENS.

Phylacogens are neither "bacterial vaccines" nor "sera" as ordinarily understood. They are sterile aqueous solutions of metabolic substances or derivatives generated by bacteria grown in artificial media.

The Phylacogens are made from a lage number of species of the well known pathogenic bacteria, such as the several Staphylococci, Streptococcus pyogenes, Bacillus pyocyaneus, Diplococcus pneumoniæ, Bacillus typhosus, Bacillus coli communis, Streptococcus rheumaticus, Streptococcus erysipelatis, etc. The various organisms are present in the material before filtration in approximately equal proportions. The cultures are incubated at 37° C. for 72 hours or longer, the bacteria killed, after which a preservative consisting of 0.5 per cent. of phenol is added to the fluid, which is then filtered through porcelain. The basic Phylacogen, made in this manner, and used in the preparation of the several specific Phylacogens, is named "Mixed Infection Phylacogen." This basic Phylacogen is a "polyvalent" preparation, or Polyphylacogen, since the organisms are not from one strain only of a given species, but from cultures made at frequent intervals and from a variety of sources.

Each specific Phylacogen is prepared by modifying the basic material (Mixed Infection Phylacogen) by the addition of an equal amount of the filtrate obtained by growing and treating the organism considered to be predominant in the pathological condition to be treated; for instance, in the preparation of Rheumatism Phylacogen, the Streptoccoccus Rheumaticus is grown and treated similarly to the several organisms entering into the preparation of the basic Phylacogen. The filtrate obtained from the preparation of the rheumatism organism is added in equal amount to the Mixed Infection Phylacogen, and the resulting product given the specific name "Rheumatism Phylacogen." A like method is employed in the manufacture of the other specific Phylacogens, such as Pneumonia, Gonorrhea, Erysipelas Phylacogen, etc.

CULTURE AND SAFETY TESTS.

Aerobic and anaerobic culture tests are made of each lot of Phylacogen prepared, to determine whether the completed product is sterile. Coincidental safety tests of the same preparations are made by injecting relatively large doses subcutaneously into each of a series of animals; if the animals remain healthy the product is passed. A large number of the test animals are anesthetized, killed, and examined, ten days after injection; in each instance the autopsy discloses nothing more than a faint trace of tissue irritation at the site of injection.

LABORATORY EXPERIMENTS.

Careful investigations were conducted in the scientific laboratories for the purpose of determining the physiologic effects of the Phylacogens, and to demonstrate their safety when used therapeutically. These researches are still going on, now more than two years since the first investigations were begun.

POTENCY.

The degree of potency or energy of the Phylacogens has been carefully ascertained by means of experiments on laboratory animals (some eight hundred of which were used in these investigations). The Phylacogens were injected subcutaneously, intravenously, and intramuscularly, and were given internally. The results indicate that the average minimum lethal dose (by *intravenous* injection) per kilo of body weight of an animal is 11.90 c.c. By comparison, it would, therefore, appear that the average minimum lethal dose for a man of 150 pounds body weight is about 809.2 c.c. The suggested *subcutaneous* therapeutic dose is 2 c.c., to 20 c.c., for the average human (150 lbs. weight or 70 kilogrammes) or, 0.03 c.c., to 0.3 c.c., per kilo. The suggested *intravenous* therapeutic dose is ½ c.c. to 5 c.c., for the average human (see above) or, 0.00715 c.c. to 0.715 c.c. per kilo. The relatively (comparatively) non-toxic action of these Phylacogens, therefore, seems assured.

It would appear from correspondence that there is some confusion as to the potency of Phylacogens. The statement has been made several times that physicians are "afraid to use Phylacogens because they are dangerous" and Parke Davis & Co. have been requested on several occasions to issue the statement that they are not dangerous. They cannot make any such a statement because, under certain circumstances, they *may* be dangerous. The proper statement is that relatively (comparatively) they are not dangerous. Sterile water or salt solution, improperly used, might be dangerous. There is not a drug in the entire Pharmacopœia that is not dangerous under some circumstances. Many of the more commonly used drugs are dangerous under certain conditions. Morphine, Strychnine, Chloroform, Ether, and so on through the entire list of powerful drugs—all are, in their proper place and given in the proper doses, and in the proper conditions, valuable therapeutic agents, but improperly used, under the wrong conditions, and in too large doses, they are certainly dangerous, and so with Phylacogen.

As a result of a great amount of experimental work on animals, it was found that the average least quantity of Phylacogen required to kill an animal, when injected intravenously with Phylacogen, was 11.9 per kilo of body weight of the animal, and that, by a simple problem in mathematics, it was shown that it would require about 800 c.c. to kill a man of 150 pounds in weight. It, therefore, is perfectly plain to be seen that, under some circumstances, Phylacogen is dangerous.

The literature suggests the administration of Phylacogen either subcutaneously or intravenously, and the range of dosage recommended is as follows:

Subcutaneous dose is 2 to 20 c.c., beginning with 2 c.c., and gradually increasing to 10 c.c.

Intravenous dose ranges from 1/4 of a c.c., to 5 c.c.

What does this mean as regards the relative potency of Phylacogen? It means just this: That the least quantity of Phylacogen required to kill a human, weighing 150 pounds, on the average would theoretically be about 800 c.c. "On the average" indicates that in some instances it might take less and in some other instances it might require more to kill a 150 pound man. If Phylacogen was administered to a sick human it might require a good deal less under some conditions to kill the patient than it would in the case of a perfectly well person, but notwithstanding this fact, the largest dose suggested in the literature, for subcutaneous injections, is 20 c.c., or 1/40 of the average lethal dose for a 150 lb. human. Patients have received doses as large as 50 c.c., administered at one time, and this dose repeated for several days, without any other result than to cure the patient of his disability. The largest dose suggested in the literature, for intravenous injection, is 5 c.c., or 1/160 of the average lethal dose for a 150 lb. human. A number of patients have received as high as 15 c.c., administered daily in the vein, with the result of curing the patient, but we do not recommend such doses. The highest dose suggested in the literature is ⅓ of this dose (5 c.c. as compared with 15 c.c.). "The relatively non-toxic action of these Phylacogens therefore seems assured."

HEMATOLOGICAL STUDIES.

The results of elaborate studies in the research laboratories indicate that in most instances the blood of animals injected with the Phylacogens undergoes but slight change, the most notable being in the number of cellular elements. Practically all tests show, following the injection, a slight diminution in the number of red cells; and a fairly constant leukocytosis, but usually without alteration in the size or condition of the corpuscles. The hemoglobin content and the specific gravity are affected very little. A large number of blood-pressue tracings have been made, indicating that a depressor (blood-pressure-lowering) principle is present in the Phylacogen. The clotting time of the blood is slightly decreased.

EFFECTS UPON THE HEART.

The Phylacogen causes a distinct effect upon the heart and central nervous system, as evidenced by a rapid pulse, which may increase to fifty beats above the rate before injection, and an increase in temperature of one to five degrees.

PHYSIOLOGICAL ACTION.

The present use of the Phylacogen, prepared according to the method originated by Dr. A. F. Schafer, may be objected to by some practitioners on the ground of empiricism, and criticised because there is just now no proved scientific explanation of the exact mode of action of these Phylacogens.

The clinical results obtained thus far with these Phylacogens fully warrant their use even in the absence of a plausible theory explaining the method by which the curative action of Phylacogen is produced.

ANAPHYLAXIS.

Extensive studies with laboratory animals were undertaken for the purpose of determining whether anaphylaxis, or dangerous sensitization of animals, could be produced by injections of these Phylacogens. No anaphylactic reactions (29) were observed in the experiments, which were most exhaustive.

CLINICAL TESTING.

In order to obtain an abundance of clinical evidence to substantiate or refute the claims for the Phylacogens, a series of searching clinical tests was instituted in March, 1911, large quantities of the various Phylacogens were submitted to skilled clinicians, and these clinical tests are being continued at the present time. This investigation has furnished abundant evidence of the therapeutic value of the Phylacogens.

With an incredulity amounting to suspicion, and with every determination to be no man's dupe, a searching investigation was begun of Dr. Schafer's claims for his bacterial derivatives (Phylacogens). A vast mass of work has been done—in the laboratory, on animals, in the hospitals, at the bedside. Literally hundreds of reputable physicians have administered thousands of doses of the Phylacogens for rheumatism, gonorrhea, erysipelas, and mixed infections. A cool critical survey of the clinical results has convinced us that the Phylacogens possess great therapeutic power.

Reports have been received in detail of six thousand, three hundred and twenty-four (6324) cases of various conditions (from March 15, 1911, to May 30, 1913) treated with Phylacogens. These clinical reports include records from nine foreign countries as follows: Canada, England, Scotland, Mexico, Cuba, South Africa, New South Wales, New Zealand, Jamaica, W. I. These together with the United States, make ten countries where Phylacogens have already been tested clinically. This series includes cases of all kinds without regard to age, sex, nationality, color, condition, environment, part of the United States, Physician in attendance, whether hospital or private case, whether suited or unsuited for treatment. Of this series of 6324 cases, 5270 are reported as cured, and one thousand and fifty-four (1054) are arbitrarily recorded as failures.

THE TOTAL STATISTICS.

Total cases	6324
Recovered	5270 (83 per cent.)
Failed	1054 (17 per cent.)

These figures need some explanation. To obviate any criticism of padding records or changing findings, or being over-enthusiastic or exaggerating, the statement of the physician reporting the case has been made the arbitrary dividing line. If he stated that his case recovered, we put it down as "recovered"—if he stated that it failed, no matter what the reason was, it was entered as a failure. The 1054 failures, therefore, include patients who were moribund, their death was inevitable. It includes cases that were not completely treated, the records showing very plainly that for one or another reason the Phylacogen treatment was given up before enough had been administered to do any good. In some instances the patient or the physician became frightened at the reaction and refused to continue, or the physician did not think that the Phylacogen would do any good and refused to go on, or the patient did not think he was getting well fast enough and refused to permit further injections. It also includes cases of wrong diagnosis, where subsequent investigation disclosed the error in diagnosis, so that Phylacogen was given under a misunderstanding and it could not have done any good. The classification of the clinical reports is extremely conservative and if unfairness be charged it has been unfairness to the Phylacogen. In other words, the showing above is the worst possible showing, and, under the circumstances, it is a splendid record.

REACTIONS.

Experience has shown that the injection of Phylacogen is usually followed by local or systemic reaction, or both. These may vary from very slight to quite pronounced reaction.

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THE NECESSITY OF ESTABLISHING AN INTERNATIONAL PHARMACOPŒIAL BUREAU.[1]

By A. Tschirch.

Of the many ideas advanced by the thinking and original Ostwald, the expression that in intellectual life energy must be conserved is one of the most productive of thought. We should not only be saving of coal and water, but likewise economical of intellectual power. The same work should not be performed at ten different places, when with the same or less expenditure of energy it can be accomplished at some central point.

This thought of Ostwald's is applicable to many spheres of endeavor, but to none so much as pharmacopœial revision. In all civilized lands we see pharmacopœial committees at work, all trying to attain as much as possible a complete and perfect review of the literature pertaining to pharmacy and materia medica. In every land the whole literature is scanned to make the revision more useful and complete—and in every land the work is done independently of other bodies. And the fact is conspicuously brought out that in the German publications, the English and American journals, and in the French, one only gets a report or an abstract of an article, or an abstract of a report of an article. So each country becomes acquainted only with the works which appear in one's own language through more or less reliable reports. Through this much valuable work is lost. It often happens that the same work is abstracted two or three times, an error is repeatedly mentioned and must be refuted two or three times. In this manner much energy is unprofitably consumed.

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[1] Translated by John K. Thum, Ph.G.

The practical Americans have long been aware of this part of pharmacopœial revision and have taken means to overcome it. For some time the Treasury Department Public Health and Marine Hospital Service of the United States publishes yearly under the title Digest of Comments on the Pharmacopœia of the United States of America, Washington, Government Printing House, a short report of pharmacopœial articles appearing for the year. The references to the articles are complete so far as the title is concerned. But the text is too short for one to obtain all that is necessary. This institution should be enlarged upon. But this can only be brought about by centralizing the work. This, to my mind, *is the first problem of establishing an International Pharmacopœial Bureau.* If the different civilized countries create such a pharmacopœial bureau the library should be combined of all the pharmaceutical publications of the earth, and in this bureau regular and detailed abstracts of all pharmacopœial articles should be made; in this manner a central office could do the same work and accomplish it in a more reliable manner than a dozen different offices whose reporting is never exhaustive and performed in a trustworthy manner. These abstracts should be published simultaneously in German, French, and English, and given out in yearly volumes. Of course, this would necessitate the establishment of a Bureau provided with two or three linguists of sufficient experience to draw from the pharmacopœial publications of the main countries in a uniform and rapid manner so that the reports could appear a short time after the close of the year. The reports should exclude all scientific matters which do not have a direct bearing upon pharmacopœial revision. On the contrary, all work relating to drugs, the establishment of their identity, methods of assay, and all other data of like import should be worthy of notice.

These references should be bound in volumes of 1000 pages each.

But the abstracting activity should not be the only mission of this International Pharmacopœial Bureau. A wider field should be a laboratory where careful attention could be given to the various methods of drug assay, both qualitative and quantitative, and comparisons made between methods now official and proposed. So only will we be successful in finding the best and simplest methods and bring them international recognition. And, as I mentioned at the Brussels Conference in 1902, it is not sufficient to give the alkaloidal content of a drug; it is also necessary to state in which manner it is best determined. For it is well known that the methods in the several pharmacopœias lead to very different results. Hence, there should be connected with this International Pharmacopœial Bureau a laboratory which should have, under the guidance of the directors of the Bureau, the services of an active, well-trained apothecary.

As the seat of this Bureau I would suggest the city of Bern, where so many international bureaus are successfully established, and I would also suggest that it would be well for this International Bureau to be connected with the Schweizeriche Sanitary Board—temporarily, at least—until it is strong enough to stand on its own feet.

To bring about the realization of this plan it would, to my mind, only be necessary for the Schweizeriche Apothekerverein, through the Swiss Sanitary Board's highest Council, to make the proposal and invite a conference of pharmacopœial experts from all interested countries to consider the plan and eventually form some program for action.

BERN, 1913.

CONCERNING INSTRUCTION IN PHARMACY AND THE CONFERRING OF DEGREES.[1]

By B. E. PRITCHARD.

The Druggists' Circular in its issue for May, 1913, contains an editorial upon "Some Common Misconceptions," and the editor tells his readers that "there seems to be a great deal of misunderstanding" about a large number of things connected with pharmacy, as well as several other matters, and reaches the very sane conclusion that if we "get a good view of any situation as it actually exists we shall not be misled by expressions of unbaked ideas by others."

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[1] Read at the annual meeting of the Pennsylvania Pharmaceutical Association, June, 1913.

In the course of this editorial I have found one paragraph that serves my purpose as a text in the writing of this paper, which follows:

"Regarding the colleges of pharmacy and what they teach and do not teach, we are glad to be able to say that we believe the usual course given in *The Average College of Pharmacy,* backed up by the three or four years of practical experience required by most of the boards of pharmacy, fits a man or woman of ordinary intelligence and education for the work usually required of a pharmacist."

This statement leads up to the query what constitutes an "average college of pharmacy"?

The same journal in its issue for April, 1913, contains another editorial in which reference is made at some length concerning the action taken by the New York Education Department in its annual revision of colleges of pharmacy to be recognized in that state, in the course of which the statement appears "The last time the list was revised the names of three or four schools were dropped, among them being that of the oldest, perhaps the largest, and by many considered the best college of pharmacy in the country." Now while the fact as stated remains, the recognized list carries the names of many obscure schools of pharmacy located in various states extending all the way from Maine to Nebraska. So that to find an average college of pharmacy one is called upon to go far afield in the search. The right to graduate from a college of pharmacy is contingent upon the percentage of good marks made by the student in the opinion of the examiners of the particular school from which graduation is sought. The right to become registered in any state as a pharmacist is based upon the percentage made in the tests submitted by the respective boards of pharmacy. Now those who constitute the examiners in colleges of pharmacy and those who serve on boards of pharmacy are men of like calibre and similar attainments, approximately, at least, hence the same wide differences of opinion as to the fitness of students for graduation may exist as we find mentioned in a very excellent editorial appearing in the *Bulletin of Pharmacy* in its issue for April, 1913, from which we make this quotation:

"Some years since, for instance, when a practical test was made at one of the meetings of the National Association of Boards (of pharmacy) it was found that the members in attendance graded the same set of replies anywhere from 60 to 82 per cent."

Now when it is remembered that the students whose papers were being passed upon were, presumably, at least, all graduates of "reputable, recognized colleges of pharmacy," is it to be wondered at that one questions why should these things be?

When great minds differ so widely, how is the humble would-be student going to arrive at a safe conclusion in selecting a school in which to prepare himself for his life work?

If one would like to form some definite idea as to how far removed from the ideal are the colleges of pharmacy of to-day, and how widely divergent are the views of the men who are engaged in conducting these schools, let him take up the volume of the proceedings of the thirteenth annual meeting of the American Conference of Pharmaceutical Faculties, an organization which carries in affiliation 35 schools engaged in the teaching of pharmacy.

It is a book containing 92 pages of printed matter, each page 6 by 9 inches. I have read this book and was greatly interested in the questions discussed and the remarks of those who did the discussing, but when adjournment was reached, so far as I was able to arrive at a conclusion of the whole matter, there remained 35 different opinions as to just what constitutes a good average college of pharmacy.

The capacity for learning as it exists among human beings has a wide range. One person, as is frequently noted, can absorb as great a fund of information in one-half, or even less, time than another person under the same teaching. A mere hint ofttimes results in leading a thoughtful person into wider range of knowledge of a particular study than would ten years of skillful teaching upon the part of trained instructors impart to another person, less fitted by nature to assimilate knowledge.

For these reasons, then, the query "Should the minimum pharmacy course extend over three years?" is not capable of receiving a definite reply. The course necessary in pharmacy is extremely flexible in application and cannot be arbitrarily fixed.

John Brown, for instance, with a retentive memory and capable of giving close attention to his studies, with an open mind to the lectures during class hours, might be able to obtain such knowledge of pharmacy as to fit him for passing a creditable examination in one year. On the other hand, John Smith, slow to assimilate, incapable of close application, not fitted by nature or disposition to listen attentively and absorb during lecture periods, might find it necessary to spend three years in a college of pharmacy before he could measure up to the required percentage that would graduate him. To my own way of thinking, there can be no such thing as a fixed minimum course in pharmacy, or any other study, for that matter. Each individual student should be permitted to graduate when he or she has shown ability to creditably meet the tests laid down. You may be able to reach that point in one year, while I might find it necessary to spend two or three or four years before being able to measure up. Length of time, therefore, can have no place in the matter of reaching the goal, and to make an arbitrary rule that any certain number of years shall constitute a minimum course in pharmacy is wrong in practice, however valuable it may be in theory.

One of the most serious, and deservedly so, criticisms attaching to labor unions is that they hold the best men in their membership back by making the standard of accomplishment to fit the capacity of the weakest brother, and are not colleges of pharmacy doing the same thing in the fixing of a minimum course in the study of pharmacy? Penalizing the bright students by compelling them to serve time because of the inability of the duller ones to meet the pace.

In the fixing of an average there must of necessity be recognized highest and lowest points. Now when so august a body as the Education Department of a great state says to the graduates of what has been herein before stated to be "by many considered the best college of pharmacy in the country," "The Board of Pharmacy will not even admit you to its examinations;" while at the same time students from some small, obscure, practically unknown school, located somewhere in North Dakota are given the glad hand of full recognition by the same aforementioned august body of educators, what is there left for me to do other than to return to my starting point and again propound the query, "What constitutes an average college of pharmacy?"

Now, having satisfactorily failed to reach a conclusion as to whether the minimum pharmacy course should extend over three years, I find myself face to face with that other perplexing problem, "What degrees should be conferred on the completion of two or three or four years in a College of Pharmacy?" And in this instance I trust I shall not be so successful in showing "how not to do it."

In taking up for consideration this subject I am fortunately not handicapped by the possession of any rear end initials myself. The only letters attaching to my cognomen are those which precede my family name, and I have troubles enough in keeping them on straight with my correspondents. I must confess that the agitation concerning the matter of degrees that seems to have stirred to the depths some men's feelings has never touched me. Hence like the qualifications sought for in the selecting of a jury, my profound ignorance of the subject may stand me well in hand. It has always seemed to me that the having of a quarter section or so of the alphabet tacked on to the hind end of one's signature does not add one jot nor tittle to either the knowledge or usefulness of the bearer thereof. The satisfaction of knowing well one's profession and being able to solve its complex problems as they arise is where all the glory lies—and it does not make it any easier to accomplish this achievement to know that it would tax the capacity of a more than ordinary sized card to carry all the symbols of the various degrees that men have seen fit to confer upon one. It gave me profound satisfaction to read not long since that the Honorable Wm. E. Gladstone held similar views upon this subject, and persistently refused to accept any degree that schools of learning and other institutions were anxious to confer upon him. It is comforting to one's sense of satisfaction to know that his is not the only wise head. I have not, however, been compelled to dodge any titles that were aimed in my direction, and in that respect I hold an advantage over Premier Gladstone.

Of late years I have noticed signs conspicuously displayed over the entrances to plumbing establishments bearing the inscription "Registered Plumber," so that the attaching of the symbols R. P. to one's name leaves it an open question as to whether one is a registered pharmacist or a registered plumber.

In the issue of the *Journal of The American Pharmaceutical Association* for April, 1913, Otto A. Wall, Ph.G., M.D., covers eight pages in the setting forth of his views concerning degrees in pharmacy, in the course of which he submits 48 different symbols attaching themselves to pharmaceutical degrees, many of them, of course, being different abbreviations in common use to indicate the same degree. Touching the contention of our own Professor Remington that P. D. as an abbreviation legitimately applies only to the degree Doctor of Pharmacy, and that its use as indicating any other degree is clearly a species of larceny, so to speak, Dr. Wall tells his readers that " No institution can claim exclusive right to an ambiguous initial abbreviation for any particular study . . . and if there are any who feel aggrieved at the resulting ambiguity they can use correct academic syllabic abbreviations for their own degrees."

Authorities contend that in the beginning there was but one degree conferred in pharmacy, that of Ph.G. meaning that the bearer of the same had been graduated by a college of pharmacy, or indicating merely the fact that the owner had completed a certain prescribed course in pharmacy of which his diploma bore evidence and the symbol Ph.G. was the sign thereof. Hence rightly construed the title Pharmacy Graduate, or its symbol Ph.G., is not in any sense to be considered as a degree. So far as I have been able to consult authority on the subject of degrees in pharmacy there are but three that carry the right to attach to one's name with any real meaning, these are Bachelor, Doctor, Master. Bachelor of Pharmacy means, just as the term bachelor does when applied to an unmarried man—an incomplete man—so Bachelor of Pharmacy means an incomplete pharmacist. Thus it would seem that when a student has graduated from a limited prescribed course of study in pharmacy he should be granted the degree of Bachelor of Pharmacy, Ph.B. instead of as is now the practice the term Graduate in Pharmacy, or Ph.G. When a student has attained to the possession of this inferior degree, and has succeeded by right thereof in becoming registered as a pharmacist on the roll of the State Board of Pharmacy he should earnestly strive at as early a stage in his career as possible to arrive at the top by fitting himself through study and experience and the taking of a post-graduate course to earn that highest degree in his profession that can be reached in course, Doctor of Pharmacy.

The degree Master of Pharmacy should never be conferred upon any one who has merely spent a few terms in a College of Pharmacy, but should by all means be sacredly reserved and held inviolate for conferring upon such good men and true as have by signal service rendered, unselfishly, and for the good of their fellows, earned the right of recognition and to have that honorable title conferred as a mark of appreciation by a University of the highest rank. Not through self seeking but for reason that the institution honors itself in soliciting the privilege of bestowing this degree upon one who has proven himself worthy to wear it.

CURRENT LITERATURE.

PRECIPITATING ALKALOIDS BY LLOYD'S REAGENT.

In a preliminary note published in the *Journal of the American Chemical Society* for June, 1913, p. 837, Sigmund Waldbott calls attention to John Uri Lloyd's patent involving reactions of intense scientific interest and wide scope, the extent of which has been perceived by no one more clearly than the discoverer himself. Reserving a more detailed statement of his labors for future publication, Professor Lloyd, at the beginning, has kindly given Mr. Waldbott the privilege of investigating the chemical and physical nature of his reagent.

This reagent is essentially hydrous aluminium silicate, derived from Fuller's earth. The reagent has the startling quality of precipitating alkaloids completely from neutral or acid solutions thereof. The alkaloid may be recovered by treatment with a base and an alkaloidal solvent. Quinine bisulphate was used exclusively in the following experiments, since Professor Lloyd himself has extended his research over a great number of alkaloids and alkaloidal salts, including those occurring in plants.

The reagent had approximately the following composition: H_2O, 17. 41 per cent.; SiO_2, 55.30 per cent.; Al_2O_3, 9.82 per cent.; Fe_2O_3, 14.18 per cent.; CaO, 1.58 per cent.; CO_2, per cent. not determined. Heating the material to about 130° did not destroy its peculiar activity; but a red heat expelled an additional quantity of water rendering the reagent inert. When the reagent is exhausted with hydrochloric acid, the residual earth is still effective. The activity of the reagent is not impaired by concentrated nitric acid or by *aqua regia*. After the alkaloid has been removed from its combination with the reagent, the residual material retains the full effect. This process results in a jelly difficult to filter and slow to settle it; it is precipitated readily by addition of an acid, or an alkaloidal salt. In drying, the jelly shrinks to a very small bulk;

conversely, the solid expands remarkably in contact with water. The jelly precipitates inorganic salts also, *e.g.*, barium chloride, lead acetate, zinc sulphate, etc.

It will be observed that the phenomenon is one of colloidal chemistry. The thought suggested itself that water-deposited clay might show the same action; indeed, it was found by Mr. Waldbott last summer that the fine blue clay so abundant in the hills of Cincinnati, after treatment with hydrochloric acid, had the same effect upon alkaloidal salts, rather faintly as may be expected, yet very distinctly.

In the course of this investigation, other colloidal materials were also examined, and it was found among others that colloidal silicic acid, or colloidal arsenious sulphide plainly precipitated quinine sulphate.

POISONING BY GINKGO.

Several botanists after dissecting the fruits of *Ginkgo* have developed what appeared to be ivy poisoning. As the juice of the *Ginkgo* produced an immediate irritation of the skin, it was suspected that the rash which developed the following day was due to this. Later tests proved this to be the case. The poison is in the outer fleshy layer. It does not affect all people, since the gardeners at Smith College and at Mount Holyoke College have never been poisoned by handling the *Ginkgo* fruits, but a gardener in Elyria, Ohio, who cares for a fruiting tree in the yard of Mr. William G. Sharp, writes that he is poisoned every fall by handling the fruits. The irritation produced is greater than that of poison ivy, and the infection spreads more persistently and is communicated from one person to another. Pustules rarely form, however, as in ivy poisoning, but there is a heavy red rash, attended by the formation of welts in severe cases.—ANNA M. STARR, Mount Holyoke College, South Hadley, Mass., in *The Botanical Gazette*, March, 1913, p. 251.

DRUG DETERIORATION.

The Wayne County (Michigan) Medical Society recently appointed a committee to coöperate with a similar committee appointed by the Detroit Retail Druggists Association to investigate the question of deterioration of drugs. Dr. W. J. Wilson, Jr., of Detroit, calls attention to this fact and sends a copy of the report:

The Committee on Drug Deterioration appointed by the joint meeting of the Detroit Retail Druggists Association and Wayne County Medical Society would respectfully report:

Recent investigations of the fluidextracts show that with few exceptions they retain their potency for a number of years when kept under proper conditions; that is, without access to air, or exposure to light.

With such drugs as hydrogen peroxid in which the absolute limit of potency is eighteen months, and the probable limit from six to twelve months, we would recommend that the manufacturers state on the label the date of manufacture as well as the limit of potency.

We would recommend that the practice of keeping all liquid preparations, such as tinctures and fluidextracts which deteriorate on exposure to light, preferably in light-proof cupboards, or in amber-colored bottles not exposed to direct sunlight, with the usual precautions of a tight-fitting and air-proof stopper, be made universal.

We would also recommend that the subject of drug deterioration be made one of the leading topics for discussion in all the state and national pharmaceutical and medical societies in the meetings of the near future.—*Jour. A. M. A.*, June 7, 1913, p. 1810.

BLAMING THE DRUGGIST.

When some years ago the Council on Pharmacy and Chemistry investigated Lactopeptine it was claimed that "Lactopeptine contains the five active agents of digestion—pepsin, diastase (veg. ptyalin), pancreatin, lactic acid and hydrochloric acid—combined in the proper proportion to insure the best results." The Council's examination indicated that Lactopeptine contained more than 90 per cent. of milk sugar. The amount of pepsin was somewhat less than 10 per cent. of official pepsin. The amount of lactic acid was found to be 3 per cent. Neither diastase nor pancreatin could be found and hydrochloric acid was present in mere traces only. Examination of another specimen not only failed to show the presence of diastase and pancreatin but also failed to show any appreciable amount of pepsin.

What have the promoters of Lactopeptine done to offset this report? The November, 1912, "Doctor's Factotum," an advertising sheet, contains the following:

"The mere presence of digestive enzymes like pepsin, trypsin, amylopsin, etc., is *not* sufficient.

"Stimulation, inhibition and activation are intimately bound up in the cycle of digestion and are responsible for its proper development and course."

After suggesting that after all it does not matter much whether enzymes are present or not we read further:

"And the most vital and most important fact in regard to Lactopeptine is that it is a *combination,* acts as a combination and secures results only to be gotten from such a combination."

Then, of course, it is suggested that only the Lactopeptine people can make this combination. Finally to cap the climax the suggestion is made that if the medicine does not do what is expected of it the druggist has practiced substitution. Thus the last word in the above-named advertising sheet is:

"Failure to get results usually means *substitution.*

"Therefore, write it thus: Lactopeptine (Genuine) and send your patient to an honest pharmacist."

We extend our sympathy to the poor druggist who so often is made the "goat" by proprietary medicine concerns. Let us hope, however, that this reflection on the druggist will not only be the cause of further discrediting Lactopeptine but also the equally discreditable substitute, Pulvis Pepsini Compositus, which the druggists have officialized in their National Formulary—this despite the fact that in 1907 the then president of the American Pharmaceutical Association (the late Mr. Leo Eliel of South Bend, Ind.) called the attention of the medical profession (*Jour. A. M. A.,* April 6, 1907, p. 1198) to the fact that the pharmacists had since 1876 been aware of the worthlessness of Lactopeptine.—Editorial in *Jour. Indiana State M. A.*, May 15, 1913, p. 219.

THE "HUMAN AQUARIUM."

Sternberg describes his examination of a circus freak who is able to drink up to seven quarts of water at a time and expel it through his mouth at will without any evidence of nausea. He also swallows live frogs and fishes and expels them in the same way. His father and grandfather had this same faculty of being able to ingest and expel large quantities of fluid at will. Sternberg noticed that the young man swallowed the ten frogs first and also expelled them first. Roentgenoscopy showed the stomach apparently normal in every respect.—*Jour, A. M. A.*, March 29, 1913, p. 1037.

MANUFACTURE AND USES OF DENATURED ALCOHOL TO BE STUDIED.

The Bureau of Foreign and Domestic Commerce, Department of Commerce, has arranged for a report by a special agent upon the use of tax-free alcohol for industrial purposes (denatured alcohol) in the principal countries of Europe.

The Bureau published last December a report on this subject made up from letters received from consuls in various foreign countries, but it is considered desirable at this time to have a special report by an agent thoroughly familiar with the manufacture and applications of industrial alcohol that will cover the field of the countries which make the most extensive and intelligent use of the privilege of tax-free alcohol.

The report will be based upon a personal investigation by the agent of the Bureau of the sources, manufacture, governmental inspection and encouragement, and all matters of interest in connection with denatured alcohol from the standpoint of its production, together with its various applications in different lines of industry, the cost to consumers, its relative merits as a liquid fuel for internal combustion engines, etc. Conditions will be studied in Great Britain, France, Germany, and the other principal countries of Europe. The investigation will be made during the coming summer, and the report published in the fall.

THE CONSTITUTION OF CYTISINE, THE ALKALOID OF CYTISUS LABURNUM.

The poisonous alkaloid of the common laburnum was first isolated in a pure form by Husemann and Marmé, who gave it the chemical formula $C_{20}H_{27}ON_3$. Later on the true composition of the alkaloid was shown by Fartheil to be $C_{11}H_{14}ON_2$, and this was further confirmed by Buchka and Magelhaës as well as subsequent workers. Dale and Laidlaw have reported that in its physiological action it closely resembles that of nicotine.

M. Freund elucidated the following main facts as a result of a chemical examination of this alkaloid by treatment with HI and phosphorus at a temperature of 230°:

(*a*) Cytisoline, $C_{11}H_{11}ON$, a feebly basic, crystalline solid, melting when pure at 198°.

(*b*) β-Cytisolidine, $C_{11}H_{15}N$, a basic oil, yielding a crystalline picrate (m.p. 229°) and platinichloride (m.p. 234°).

(*c*) A mixture of hydrocarbons melting at 185–230°.

(*d*) Ammonia.

Later Freund found that on electrolytic reduction, cytisine was changed into a base, tetrahydrodeoxycytisine. The action of hydriodic acid seemed to offer the only hope for determining the constitution of cytisine. Many attempts were made to get some product of oxidation from the alkaloid which might throw some light on the problem of its constitution. It is readily attacked by oxidizing agents; such as potassium permanganate and chromic acid, but, however the conditions are varied, no pure product can be isolated except oxalic acid. Attempts to decompose cytisine by the action of acids or alkalies at high temperature proved unavailing. Cytisine is stable to a remarkable degree towards these reagents. The experiments of Freund were very carefully repeated by Ewins, who gives in detail his work on the subject and seems to think that the constitution of this alkaloid remains an open question (A. J. Ewins, B.Sc. *Transactions of the Chemical Society*, Vol. 103, 1913. London.)

John K. Thum.

THE CONSTITUTION AND SYNTHESIS OF DAMASCENINE, THE ALKALOID OF NIGELLA DAMASCENA.

The literature relating to this alkaloid is briefly reviewed and the main facts brought out. Schneider (Pharm. Centr.-h., 1890, 31, 173) was the first to isolate it from the seeds of *Nigella damascena.* He described it as a crystalline solid, m. p. 27°, with the composition $C_{10}H_{15}O_3N$. Subsequently this was shown to be substantially correct, the formula really being $C_{10}H_{13}O_3N$.

The constitution of damasceninic acid, easily formed from damascenine, was shown by Keller to be 2-methylamino-3-methoxybenzoic acid. He unsuccessfully attempted its synthesis.

Ewins gives his method of extracting the alkaloid from the seeds by the shaking out process, using light petroleum. The alkaloid and its salts agreed absolutely with the synthetic product and its salts.

All the work done in building up this synthetic is carefully detailed in a most interesting manner.

Briefly it consists of converting m-hydroxybenzoic acid into m-methoxybenzoic acid by methyl sulphate and potassium hydroxide. This acid on nitration under suitable conditions gives a mixture of nitro-derivatives, from which the required 2 nitro-3-methoxybenzoic acid is isolated without difficulty. This on reduction yields 2 amino-3-methoxybenzoic acid, which on treatment with methyl iodide yields the hydriodide of 2 methylamino-3-methoxybenzioc acid. This salt was converted into the corresponding hydrochloride, which was found to be identical with the hydrochloride of damasceninic acid. The acid on esterifying by Fisher's method gave a methyl ester, which proved to be identical with the natural alkaloid damascenine.

The steps in the synthesis are shown by the following scheme:

m-Hydroxybenzoic acid.
↓
m-Methoxybenzoic acid.
↓
2 Nitro-3-methoxybenzoic acid.
↓
2 Amino-3-methoxybenzoic acid.
↓
2 Methylamino-3-methoxybenzoic acid.
↓
Methyl 2-methylamino-3-methoxybenzoate (damascenine).

(A. J. Ewins in *Transactions of the Chemical Society,* Vol. 101, 1912. London.)

John K. Thum.

PEPPER.

Pepper of commerce is the product of *Piper nigrum,* a trailing or climbing vine of the East Indies.

Both the white and black pepper are from the same plant, in the case of the white kind, the rind or outer covering is removed by maceration, drying white. Chinese pepper planters obtain pepper for their own use in a very singular manner. Certain tropical birds are very fond of eating the "red" pepper berries and appear to discriminate, selecting only the very best. These are undigested and voided by the birds, the "garden" coolies are instructed to gather all obtainable, it being most highly prized and quite unobtainable in commerce; in fact, to receive a gift of this from a Chinese towkay is considered to be a mark of very great esteem. In cultivation a "pepper garden" somewhat resembles an hop garden, the vines are planted on hillocks and are trained around poles and look very pretty with their harvest of green, red, and black berries.

From a letter by Ernest Jenkins, of Kew Gardens, to the writer.

C. S. Braddock, Jr.

VOLATILE ANTISEPTICS AND SOIL ORGANISMS.

In an article on "The Effect of Toluol and Carbon Disulphide on the Micro-flora and -fauna of the Soil," P. L. Gainey (Missouri Botanical Garden, Twenty-third Report, 1912), draws the following conclusions:

1. That small quantities of carbon disulphide, toluol, and chloroform, such as have been used practically and experimentally, when applied to the soils studied, exert a stimulative rather than a diminishing effect upon the total number of bacteria present.

2. That an application of such quantities of carbon disulphide and toluol does not have an appreciable effect upon the number of types of protozoa present in such soils as have been studied.

3. That a very marked increase in yield may be noted following such an application when no evident change occurs in total number of bacteria present.

4. That, in the light of the recent work of Koch, Eforoo, Goodsey, Fred, and others, with results presented in this paper, the theory advanced by Russell and Hutchinson to account for the increased yield following the application of such chemicals, appears not tenable for general application.

THE SOURCE OF SIAM BENZOIN.

The lack of information as to the source of Siam benzoin has been pointed out at various times in the *Pharmaceutical Journal* by Mr. E. M. Holmes, and in response to his application for assistance to trace the origin of the product Dr. Kerr was communicated with on the subject. We are much indebted to Dr. Kerr for his kind reply to our enquiry from which we have extracted the following interesting information.

The *Styrax* tree which grows on Doi Sootep and which is fairly common at 600 to 1200 M. altitude in evergreen jungles particularly in that type of forest where *Quercus Junghuhnii* predominates and where the soil consists of a stiff red clay overlain by a thick layer of humus, was, from flowering material only, believed to be *S. Benzoin* (*Kew Bull.*, 1911, p. 409). The receipt of fruiting specimens showed, however, that it was not *S. Benzoin* but a new species closely allied to *S. suberifolius* and since described as *S. benzoides* (*Kew Bull.*, 1912, p. 267). *S. benzoides,* on Doi Sootep, grows rapidly and attains a height of 12–15 m. and a girth of about 9 dm. but most of the trees are smaller though in other parts larger trees are reported. Several Kamus, natives of the Luang Prabang region from which most of the gum comes, have, without a leading question, identified the Doi Sootep tree as ton kum yan, kum yan being the Lao and Siamese name for gum benzoin. It must be admitted that small specific differences might not be noted by the natives though they are often acute observers of such points particularly where economic plants are concerned.

Dr. Kerr's belief that this tree is the source of the Siamese gum benzoin has been confirmed by the receipt at Kew of a small sample of the gum collected from the Doi Sootep trees which in smell, taste and fumes is identical with commercial Siamese gum benzoin. Though the gum is only casually collected in the Chiengmai district yet nearly every tree examined on Doi Sootep had been notched and in some cases completely felled. In the majority of cases the cuts were very old and on most trees no gum at all was observed but on a few there was a small incrustation of gum along the cuts. The largest piece of gum obtained weighed about 2.5 grammes and was found in a hole made by some wood-borer. It was a homogeneous, transparent, pale amber piece with the characteristic odor of Siam benzoin.

The principal method of collecting the gum is by making V-shaped incisions through the bark. The gum runs slowly into bamboo joints placed at the bottom of the V, and is not collected until a few weeks after the incision is made. This is generally done during the hot season. Gum is also frequently found in holes made by wood-borers and sometimes on or in the ground at the foot of the trunk. The quality of the gum is the same by whatever method it is collected. Whether any particular tree will yield gum or not can only be ascertained by tapping, as only the larger trees and not even all of them yield gum.

None of the gum obtained near Chiengmai is exported, but nearly all of it is used locally, mixed with pig's fat, as an application for the hair. Most of the gum which reaches Chiengmai is brought there by the Kamus during the cold season from the Luang Prabang region to the East of the Mê Kong. A native merchant buys it and ships it to Bangkok. This merchant estimates his yearly purchases at 5 sens (approximately 10 cwt.), but for the last two years the quantity has been less, because, he says, it no longer pays the Kamus to collect it and bring it down. Although the merchant had heard that the tree grew on Doi Sootep he had never bought gum from any district but Luang Prabang.

Gum benzoin is also brought to Korat in Lower Siam but no information as to its source is available.—*Kew Bulletin.* Reprinted in *Bangkok Times Weekly Mail.*

CHARLES S. BRADDOCK, JR.

BOOK REVIEW.

PROCEEDINGS OF THE AMERICAN PHARMACEUTICAL ASSOCIATION, including the report on the progress of pharmacy to January 1, 1912. Also the constitution, by-laws and roll of members. Scio, Ohio: Published by the American Pharmaceutical Association, 1912.

This long expected volume has finally reached the members of the American Pharmaceutical Association and despite the fact that the title is somewhat of a misnomer because the book contains no record of the proceedings at the annual meeting of the American Pharmaceutical Association, the volume will nevertheless be generally welcome because of the 524 pages devoted to the report on the progress of pharmacy from July 1, 1910, to December 31, 1911. This report is prefaced by an introductory in which the venerable reporter on the progress of pharmacy records the origin and subsequent development of these reports and expresses the hope that the proposed publication of selected abstracts in the Journal of the Association will disarm much of the criticism formerly made regarding delay in publication of the annual volume. In addition to the proposed publication of selected abstracts in the journal of the constitution and by-laws of the American Pharmaceutical Association, are a geographical roll of members, an alphabetical list of members and a well arranged index of 34 double column pages that will serve to make the content of the volume of permanent value to pharmacists who are interested in the professional side of their calling. The receipt of this volume will no doubt reawaken in the minds of many, and let us hope the majority of the members of the American Pharmaceutical Association, the hope that the recent decision, of the Councils of the Association, to discontinue the annual volume will be reconsidered and that ways and means will be found to continue the publication of the Report of the Progress of Pharmacy in the form of a bound, separately indexed volume in keeping with the one now before us.

M. I. W.

OBITUARIES.

John W. Ridpath, son of Robt. Ridpath and Eleanor Blair, was born in Upper Onslow, Colechester County, Nova Scotia, Oct. 1st, 1840. His father, a ship carpenter, was drowned on July 19, 1841, while trying to save the life of a fellow workman.

During the fall of 1864, Mr. Ridpath visited his home in Nova Scotia, stopping at Boston on his way. Upon returning to the United States he took up his residence at Jenkintown, purchasing the painting business of William Pearson. He took out his naturalization papers on Oct. 13th, 1868, voting for the first time in Abington Township, now Jenkintown, on Oct. 12th, 1869.

Finding the work detrimental to his health, in the fall of 1870 he discontinued the business of painting and entered the drug business, which he continued until April 8th, 1892. He was made a member of the Philadelphia College of Pharmacy, Aug. 5th, 1870, and of the Pennsylvania Pharmaceutical Association, April 23rd, 1880.

His membership in the Franklin Institute dates from March 10th, 1882, from which time he has taken an active part in the work of the Institute, lecturing before that body and many other prominent societies, and public and private schools of the lower end of Montgomery County.

On April 25th, 1889, Mr. Ridpath was elected Secretary of the Jenkintown Water Company and on Jan. 7th, 1890, Manager of the same.

He has served the public in the following offices: Borough Auditor, three years, beginning 1875; Board of Health, from its organization in 1885 until 1887; Justice of the Peace, five years, taking the oath of office on April 27th, 1888.

He has been connected in an official capacity with the Cheltenham and Willow Grove Turnpike Company since Nov. 8th, 1886, when he was elected Manager and Secretary; also with the Doylestown and Willow Grove Turnpike Road Company and the Hatboro and Warminster Turnpike Road Company, under the direction of the Philadelphia Rapid Transit Company.

At the time of his death, he was Secretary of the Jenkintown Lyceum Association, of which body he has been a member since Sept. 19th, 1876. He was a charter member of Pioneer Fire Company No. 1, of Jenkintown; also a charter member of Jenkintown Lodge, No. 400, F. & A. M.; a member of Abington R. A. Chapter No. 245; President of the Board of Directors of the Abington Library Society; a member of the National Geographical Society; of the Franklin Institute of Pennsylvania; Life Member of the Philadelphia College of Pharmacy; member of the American Good Roads Association; of Jenkintown Lodge No. 476, K. of P.; active member of the Bucks County Historical Society; Superintendent and Treasurer of Cheltenham and Willow Grove Turnpike Company, of Hatboro and Warmister Turnpike Road Company and of the Doylestown and Willow Grove Turnpike Road Company.

Mr. Ridpath was elected corresponding member of the Adjunct Montgomery County Medical Society on May 8th, 1885, and at the time of his death was one of the two living original members. His fame as a local historian was known throughout the Counties of Montgomery, Bucks, and Philadelphia, many of his articles having appeared in various magazines. Among them are "The Early History of Jenkintown," "Amateur Photographic Failures," "Free Masonry in Jenkintown," "History of Friendship Lodge, No. 400," and "Early Ridpaths in Scotland." He edited the first newspaper ever published in the Borough of Jenkintown, "The Pestle."

He is survived by a widow, two sons, and three daughters.

Horace W. Estlack, engaged in the retail drug business at 1233 South 17th Street, died March 8, 1913, from pneumonia after an illness of one week. His ancestors were members of the Society of Friends. He served part of his apprenticeship with his father, Thomas A. Estlack, a graduate of our college of the class of '44, who owned a store at 18th and Market Street. He completed his apprenticeship at the store of Mr. Amos Yarnall, whose store was located at 15th and Market Street. Mr. Estlack graduated in 1868, his graduating thesis being on Podophyllum. He conducted a business for himself at 16th and Race Street in 1872. Two years later he opened a store at 1233 South 17th Street which he conducted until the time of his death. He joined the college in 1893. He led a very active life, had a number of outside interests and was entrusted by his fellows with positions requiring confidence and which he faithfully discharged.

PENNSYLVANIA PHARMACEUTICAL ASSOCIATION.

The annual meeting of the Pennsylvania Pharmaceutical Association was attended by a large number of pharmacists, representing all phases of the profession and trade. Great enthusiasm prevailed when it was announced by John C. Wallace, Chairman of the Committee on Legislation, that house bill 532 for the restriction of the sale of habit-forming drugs had passed the Senate and was before the Governor. This bill was framed by L. L. Walton of Williamsport and received the support of the State Association which, with the Philadelphia Association of Retail Druggists, has been making every effort to secure its passage. It prohibits the indiscriminate sale of such drugs as opium, morphine, heroin, and codeine except upon the prescription of a physician, dentist or veterinary, but does not prohibit the public from getting legitimate preparations, containing certain specified minimum quantities of these drugs. The bill conforms to a national measure introduced in Congress by Representative Hartyson of New York. The Association forwarded a resolution to Governor Tener urging him to sign the bill.

The following officers were elected: President, Richard L. Lackey; First Vice President, Charles R. Rhodes; Second Vice President, George J. Durbin; Secretary, Edgar F. Heffner; Assistant Secretary, Lewis H. Davis; Treasurer, H. E. Gleim.

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THE POISONOUS CONSTITUENT OF THE BARK OF ROBINIA PSEUDACACIA.

By Frederick B. Power.

In a recent publication by Professor R. Kobert, of the University of Rostock, Germany, entitled: "Beiträge zur Kenntnis der vegetabilischen Haemagglutinins," which has been reprinted from a memorial volume of the *Landwirtschaftliche Versuchs-Stationen,* Band lxxix–lxxx, some very astonishing statements have been made respecting the protein of the bark of *Robinia Pseudacacia,* Linné. This protein substance was first obtained by me in the summer of 1889, and the fact that it possesses the well-known poisonous properties of the respective bark was conclusively shown in a paper read before the Wisconsin Academy of Sciences, Arts and Letters on December 27, 1889, which was also published in the *Pharm. Rundschau,* New York, 1890, **8**, 29–38. In a subsequent communication (*Pharm. Journ.,* London, 1901, **67**, 258) I had shown that this protein, to which in the meantime Kobert had assigned the name *robin,* possessed enzymic properties, and that it was capable of hydrolyzing both amygdalin and sinigrin (potassium myromate) with the production respectively of bitter almond oil and mustard oil, as also of clotting milk. In the last-mentioned paper consideration was taken of a statement in a dissertation by one of Professor Kobert's pupils, namely, Dr. Carl Lau (Rostock, 1901), whereby it was intimated that the toxic action of the Robinia protein had first been established by him. The exact statement by Dr. Lau (*loc. cit.,* p. 259) was as follows: "*Ich würde sehr gern noch eingehendere Versuche darüber eingestellt haben, ob die giftige Eiweissubstanz der Robinienrinde ein Albumin, eine Albumose, oder ein Globulin, oder ein Gemisch zweier Substanzen ist. Zu* *derartigen Versuchen hätte ich jedoch viel grössere Mengen von Material gebraucht als sie mir zur Verfügung standen. Ich musste mich daher damit begnügen festgestellt zu haben dass es sich thatsächlich um eine giftige Eiweisssubstanz handelt."* In another place, with the incorrect assumption that I had assigned to the Robinia protein a name (*robinin*) which might cause it to be confused with the coloring matter of Robinia flowers, Lau remarked: "*Man wird daraus ersehen, wie zeitgemäss es war, unsern Giftstoff aus der Robinie in Robin umzubenennen.*"

It will be seen from the above quotations that in 1901 the poisonous action of the Robinia protein was recognized by Professor Kobert and his pupil, and in this connection it seems desirable to repeat what I had recorded in 1901 (*loc. cit.*, p. 259) that some time after having obtained the poisonous protein from Robinia bark I sent a specimen of it to the late Professor Flückiger, of Strassburg, and in a letter from him under the date of February 4, 1892, which is still in my possession, he wrote as follows: "I have to thank you for the poison of Robinia, which I sent finally to Prof. Kobert, Dorpat (Russia). He has also prepared the poison, and states now that it nearly agrees with your preparation."

In view of all the well-known facts, which have been so completely substantiated, concerning the toxic action and other properties of the Robinia protein, it is difficult to understand how Professor Kobert could now have been led to make such obviously incorrect and misleading statements on this subject as are contained in the recent, above-mentioned publication. He there notes (*loc. cit.*, p. 82) that he has repeated his own experiments, and must withdraw the statements made together with Lau respecting the poisonous action of robin, those statements being now regarded by him as attributable to the impurity, imperfect solubility, or the immoderately large doses of the preparation used at that time. The preparation more recently employed by him, while acting energetically on some kinds of blood, was found not to be poisonous for rabbits when injected subcutaneously in amounts of 1 to 10 c.c. of a 0.4 per cent. solution. He therefore concludes that the symptoms of poisoning produced in man and animals by Robinia bark cannot be referred to robin, but presumes that the poisonous principle is the alkaloid or glucoside of the bark. Having thus inferred from the results of the above experiment that robin cannot be regarded as poisonous in small doses, he concludes that he must place it in the group of "phasins," or non-poisonous agglutinants.

Some still more surprising statements are made by Professor Kobert (*loc. cit.*, p. 83), which may literally be translated as follows: "For distinguishing the robin of Robinia bark from ricin the property of hydrolyzing sinigrin, as found by Power, would be admirably adapted, as this is not otherwise possessed by a single vegetable agglutinin. Experiments have shown, however, that Power's statements are not valid for the robin of Robinia bark prepared by me (Kobert) and preserved in a dry state. It does not hydrolyze sinigrin even by its action for two days in an incubator and does not otherwise possess the property of hydrolyzing glucosides. It also has no coagulating effect on milk."

It is exceedingly unfortunate that Professor Kobert should have given such prominence to the results of experiments from which thoroughly incorrect inferences are liable to be drawn, especially by those who cannot conveniently repeat them, and he does not seem to have considered it necessary to ascertain the cause of his failure to obtain the results recorded by me. As the subject is one of considerable importance, I have deemed it desirable to present such facts as are believed to be sufficient to prove the incorrectness of Professor Kobert's conclusions, and to substantiate in every respect the accuracy of the statements previously recorded by me regarding the toxic action and other properties of the protein of Robinia bark.

In the first place it was noted in my paper on this subject in 1890 that a decoction made by boiling 100 grammes of the bark with water was taken without any ill effect or any perceptible action, whereas a cold infusion of about 5 grammes of the bark was in one instance so violent in its action as nearly to prove fatal. It was thus evident that the activity of the poisonous substance was destroyed at the temperature of boiling water, and this observation suggested not only the protein nature of the substance but also the method subsequently employed for its isolation. Moreover, the protein material, as precipitated by alcohol from the liquid obtained by macerating the ground bark with cold water, when collected, washed with alcohol, and dried in a vacuum or over sulphuric acid, possessed the same poisonous properties as the bark. When administered to a large dog in an amount representing about 30 grammes of the bark, it caused severe vomiting, which continued at intervals for several hours, and a considerably smaller quantity was not without effect. A solution of the same substance, when heated sufficiently to coagulate the protein, was quite devoid of activity. As the above experiments had been conducted with a bark collected by myself at Madison, Wisconsin, it may be noted that some years subsequently a quantity of protein material was prepared from Robinia bark collected in France. This protein material, when isolated by the simple method above described, possessed the same toxic properties as that previously obtained. It is well known that substances of this character lose their activity to a greater or less extent on keeping, even in a dry state, and that they also undergo change in this respect when their purification is attempted by methods of repeated solution and precipitation or by subjecting them to dialysis. Some change of this nature may have taken place in the material employed by Professor Kobert for his recent experiments, and this would appear to be the most probable explanation of the results now obtained by him, which, moreover, are so completely at variance with his own earlier observations.*

As a specimen of the Robinia protein which had been prepared by myself in 1904 was still available, it was deemed of interest to ascertain whether it still retained its original toxic properties. It was therefore kindly tested with respect to its activity by Dr. H. H. Dale, Director of the Wellcome Physiological Research Laboratories. An amount of 0.25 gramme was administered by the mouth to a dog, when, after an interval of about an hour, it produced two attacks of vomiting. This result, together with the observations previously recorded, as noted above, clearly demonstrate that *the poisonous constituent of Robinia bark is a protein.* They certainly lend no support to the statement of Professor Kobert that the respective protein, or robin, is a non-poisonous "phasin," or to his presumption that the activity of the bark is due either to an alkaloid or a glucoside.

There remains to be considered the statement of Professor

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* Since writing this paper I have been favored with a private communication from Professor Kobert, in which he informs me that his method of testing the hydrolytic action of robin was by mixing a 1 per cent. solution of the protein with a 1 per cent. solution of sinigrin, and observing the result after keeping the mixture for some time, either at the room temperature or at a temperature of 38° C. It is not surprising that under these conditions no odor of mustard oil was perceptible. Apart from the extreme dilution of the robin solution employed, it is probable that in the preparation of the latter the active portion of the protein had been removed.

Kobert (*loc. cit.*, p. 83) that the robin, or protein material prepared by him was not capable of hydrolyzing sinigrin, and possessed in fact no hydrolyzing action on glucosides, nor did it coagulate milk. His failure to obtain positive results in these experiments was certainly due to no inaccuracy in my observations, as would thereby be implied. Since the receipt of his publication I have again tested in this direction the above-mentioned specimen of robin which was prepared in 1904, and had thus been kept, in well-stoppered bottles, for a period of nine years. This material was both in the form of dark brown scales, as originally obtained on drying the precipitated protein, and in the form of a lighter-colored powder, which was produced at the same time by triturating the first mentioned product. These two forms of the preparation were separately tested, both with amygdalin and with a well-crystallized specimen of sinigrin (potassium myronate) in the following manner: Into a small test-tube, provided with a well-fitting cork, was brought a small quantity of the respective glucoside, together with some of the dry protein, and a little water subsequently added. The tubes being then corked, and the mixtures vigorously shaken, they were set aside at the ordinary temperature (16–18° C.) and occasionally agitated. After a period of about 24 hours or less the tubes were opened, when in the one case there was a strong odor of bitter almond oil, and in the other an equally distinctive, sharp odor of mustard oil. The unmistakable results of these tests, which are doubtless obtained much more quickly with the fresh Robinia protein, thus not only confirmed my previous observations, but they have now also been confirmed independently by five chemists in these laboratories. It was not deemed necessary to again repeat the test with milk, the coagulation of which by the protein, or an enzyme therein contained, I had previously fully and accurately described.

The properties which the protein material designated as "robin" has been shown to possess renders it probable that, like other similar products, it is a mixture of substances, but no method is known to the present author by means of which a separation of its constituents could be effected without a corresponding loss of activity. It is also not known whether the toxic action of the protein is due to a substance which at the same time possesses enzymic properties, but as the last-mentioned properties are so varied in character, no doubt can be entertained respecting the presence of several enzymes. Apart from the frequently observed occurrence of enzymes, or mixtures of such, which effect the hydrolysis of amygdalin, it has been ascertained by Th. Bokorny (*Chem. Zeitung.*, 1900, 24, 771) that myrosin or a similar ferment is also widely distributed, having been found in plants of many different families besides the *Cruciferæ*, although the glucoside (sinigrin) which yields mustard oil has as yet only been found in the last-mentioned family. A milk-clotting enzyme, or phytochymase, has also been stated to occur in various plants.

The confusion which is likely to be produced in the literature in consequence of the recent statements published by Professor Kobert is much to be regretted, especially as his conclusions, which appear to have been too hastily formed, are so obviously and demonstrably wrong. It is for this reason that I have deemed it my duty to again place on record the above-mentioned facts, as also to maintain that the observations noted in my previous publications (*Pharm. Rundschau*, 1890, **8**, 29, and *Pharm. Journ.*, 1901, **67**, 258) respecting both the toxic action and enzymic properties of the protein ("robin") of Robinia bark are perfectly correct.

THE WELLCOME CHEMICAL RESEARCH LABORATORIES,
London, E. C.

THE NATURE AND STRUCTURE OF COCHINEAL.*

BY HENRY KRAEMER.

The cochineal insect is indigenous to Mexico and Central America and in general appearance resembles a wood louse. It is usually found growing upon certain flat-stemmed forms of the Cactus family, chiefly species of Nopalea. The red dye found in the remains of the female insect has been long esteemed by the old races in these sub-tropical countries. Indeed, not only did they appreciate its value, but in order to increase the supplies, the cacti with the insects were successfully cultivated many years before even Cortez landed in Mexico in the early part of the sixteenth century. The real nature of cochineal, however, was not known until some time after the introduction of the commercial article into Europe. In 1530 Acosta[1] concluded that it was of animal origin. It was

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* Read at the annual meeting of the Pennsylvania Pharmaceutical Association, June, 1913.

Fig. 1.

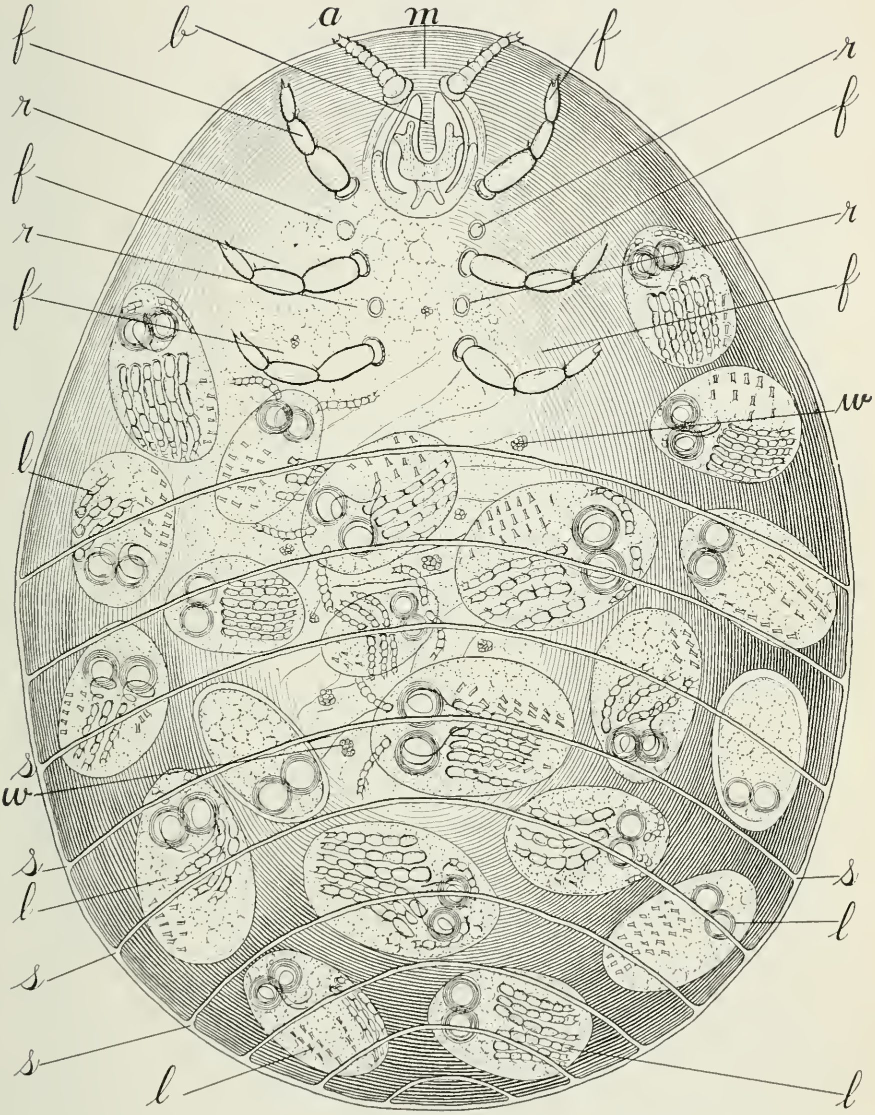

Diagram of cochineal insect of commerce showing an ovoid sac-like membraneous cradle enclosing numerous young larvæ (*l*). Parts of the mother insect : *m*, mouth part ; *b*, beak or proboscis ; *a*, antennæ ; *f*, three pairs of legs ; *r*, respiration channels or breathing pores ; *s*, segments in abdominal region ; *w*, wax-pores.

supposed, however, by many others to be in the nature of a vegetable product and spoken of as a fruit or berry. Even as late as the early part of the eighteenth century a controversy waged in Holland as to whether cochineal was of animal or vegetable origin. This was finally settled apparently by that great pioneer microscopist, Antonius van Leeuwenhoek, who rather conclusively showed it to be of animal origin.

Leeuwenhoek's article on Cochineal was written probably during the latter part of the seventeenth century. It will be found in a chapter in a large work, entitled "Select Works of Antony van Leeuwenhoek," translated by Samuel Hoole. A copy of this book is in the Public Library of New York City. Leeuwenhoek[2] in this article says:

> "When I first applied myself to investigate the nature of cochineal, I concurred in the general opinion which then prevailed that it was the fruit of some tree; and having at the request of the Honorable Mr. Boyle further prosecuted the examination, each single piece or fruit, as I then thought it, appeared to contain one hundred or upward of what semed to me to be very small seeds, shaped like eggs, each enclosed in its particular membrane; these objects, however, I could not bring into view, until the cochineal had lain in water for some hours, and then the outer skin being taken off, these apparent seeds which were very soft presented themselves; the membrane was filled with a watery substance, of a lovely red, but the seeds were of a dark red or tawny color. The seeds themselves, upon being dissected, appeared to consist of nothing but very minute globules of a red color.
>
> "The remainder of the cochineal, or that part of it which enclosed all these seeds, was composed of very thin membranes, which were also of a red color, except that a very small quantity was to be seen of a certain colorless substance, which to me had the appearance of an oil. And to give an idea of the general appearance of the figure of cochineal, I know not any manner of expressing it, better by comparison, than with a parcel of dried black currants with their skins and seeds, regard nevertheless must be had for the different sizes of the currants and the cochineal. Lastly when I divided the membranes or seeds of which cochineal appeared to consist, into as thin portions or particles as I was able, those thin particles did not as I may say, exhibit any particular color.
>
> "The preceding observations I communicated by letter to Mr. Boyle, from whom I received an answer to the following effect: that he had understood from the Governor of Jamaica that cochineal was produced from the fruit of the fig-tree,* when in a state of decay, at which time there proceeded

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*Mylius[9] (*loc. cit.*) mentions "Indian Fig" as a synonym for the Nopal plant on which the cochineal insect is found. The fruits of the Mexican Opuntia (*Nopalea coccinellifera*) are commonly known as the "prickly pear" and hence the plant is sometimes referred to as "fig tree."

from thence certain maggots or aurelias which changed into flies; that these flies settling on the trees were then killed by making fires under the trees, the smoke of which caused them to fall down; after which they were stripped of their heads, the fore parts of their bodies, and their wings, and the remainder preserved for use, so that cochineal was properly and in truth the hinder part or tail of a fly, and consequently, that my observations were so far correct that the substance I had seen were really eggs, such as are found in the hinder part of the silk-worm's moth.*

"To this I replied, that in my preceding observations, it was impossible for me to judge, that cochineal was an animal substance, because there was nothing to be seen in it that resembled an animalcule, and I concluded that if it had been an animal, it would have been devoured by those animalcules, called mites; and I added, that in consequence of the information communicated by the Honorable Mr. Boyle, in his letter I had repeated my observations, the result of which as I communicated them to him is as follows:

"On this renewed investigation of the subject, I was fully convinced that every single grain of cochineal was part of an animalcule from which not only the head, the fore part of the body, and the wings, had been broken off, but that also the legs, and that part of the body to which the legs are joined had been thrown away, so that nothing was left, except the animal's hinder part; and I imagined that the colorless substance before mentioned, and which was to be observed in the chinks or creases in every grain, was some preparation, applied to the cochineal, when it is collected for sale, to defend it from mites, which otherwise would destroy or devour it.

"These creases or rings, in every grain of cochineal, I imagine are, the articulates or joints, in those kinds of maggots or caterpillars, which afterward change into a flying insect; and I did not doubt, that at the proper season, when a similar kind of insect could be found in this country I should establish the fact, allowing only for the difference for shape and color between them, and those which constitute cochineal."

He then goes on to say that he examined a large parcel of cochineal and found in it several of the shells or coverings of the wings, which shells were of a black color, with each a red spot in the middle. He also mentions finding fragments of what he terms aurelias which he concluded were formed from the maggots or caterpillars of this species, and in one of them was a piece of a maggot, which, in part, seemed to have been devoured by a mite.

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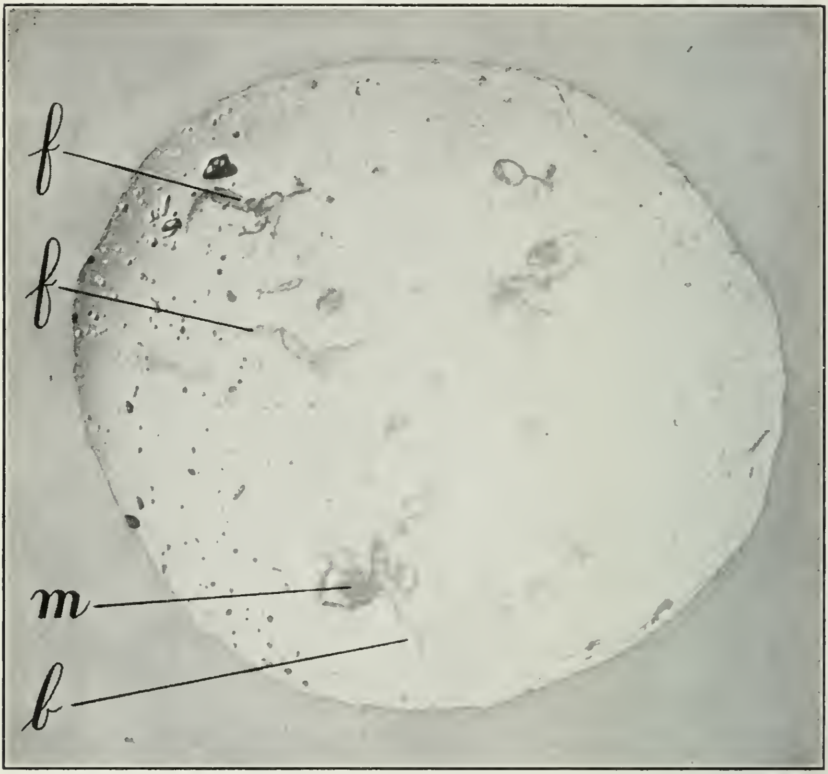
*It is doubtful if by the methods that Leeuwenhoek used in clearing his material that he actually saw the eggs or larvæ. Certainly if he was able to see the larvæ he would have seen the mouth parts and legs of the mother insect and not come to the conclusion that the cochineal of commerce represented only the hind portions of the insect. This may be readily confirmed by examining the microphotographs of the cochineal of commerce, Figs. 2 and 3.

He further compared cochineal with a small flying insect called by the children "lady-birds," and which are found when the white nettles are in bloom. The latter were killed, and taking off their wings, feet and heads he found that the cavity that is seen on every grain of cochineal, is on the back or upper side of the animalcule and is caused by the drying; that part of the grain which appears with a kind of rifing (ridging?) is the lower part or belly. As to those grains in cochineal, which have smaller cavities than others, I conclude that they must have been female insects, whose bodies being filled with eggs do not admit of their contracting in so great a degree; and though the hind parts of the bodies of these insects which compose cochineal do somewhat differ from those of the lady-birds,

Fig. 2.



Microphotograph of cochineal insect of commerce showing: *b*, partially extended beak or proboscis; *m*, mouth portion; *f*, two of the legs still intact.

yet I was now more than ever assured that not only the insect which produces the cochineal, but also those others which I have just mentioned, are formed from maggots or caterpillars.

Leeuwenhoek then ascertained that the rings or creases which occur in the commercial cochineal are accidentally produced in the drying, and concludes that the cochineal insect is composed of fourteen joints, rings, or articulations. Furthermore he says that after he left the grains of cochineal in water for twenty-four hours or more he observed that the cavity which had been caused by the drying, was swelled and extended to its original shape, so that the grains appeared exactly to agree, in form and make, with the hinder part of those insects whose wings and bodies are covered with shells or cases. While in some respects, considering the time when they were made, Leeuwenhoek's observations seem nothing short of remarkable, it is probably nearer the truth when we say that he was a fortunate observer with unusual insight. He had a scientific mind and used his reasoning faculties with remarkable success, so that many of his observations form the starting point for very much scientific work. Since his time the male and female insect have been described and they are illustrated in a number of works on entomology as well as in some of the encyclopedias. The best illustrations of the male and female insects will be found in the article by Raphael Blanchard.[20]

Before taking up the structure of the insect it may be well to say something about its position among insects and to consider some of the facts known concerning its developmental history.

Cochineal Insect and its Habitat.

The cochineal insect belongs to the order *Hemipteræ*, suborder *Homoptera*, Family *Coccidæ*. The latter includes the scale-like insects which are characterized by the fact that the wingless female dies shortly after producing her eggs, the latter being covered up by her dead scale-like body.[3] In the case of the cochineal insect the larvæ are found, as will be shown later on, within her inflated body. In the group of the *Coccidæ* we find a number of interesting scale insects. Here we find the lac insect from which stick-lac of commerce is produced, the latter being a resinous substance excreted by a species of *Coccus* (*Carteria*) *lacca* which inhabit the branches of several tropical trees. From the bodies of these insects also certain coloring agents known as "lac dyes" are produced. China wax, the excretion of an insect known as "Pela" (*Ericerus pela*) is also the product of a scale insect belonging to this family. Comstock[4] states that there are many species of the *Coccidæ* which excrete wax in considerable quantity. While some of the members of this family produce useful products, others are among the most injurious of insects. Some of our citrus fruit trees, as the orange, are very much injured by the scale insect *Aspidotus aurantii.* The San José scale, causing serious damage to very many of our fruit trees, is also produced by a scale insect, *Aspidotus perniciosus.*[5]

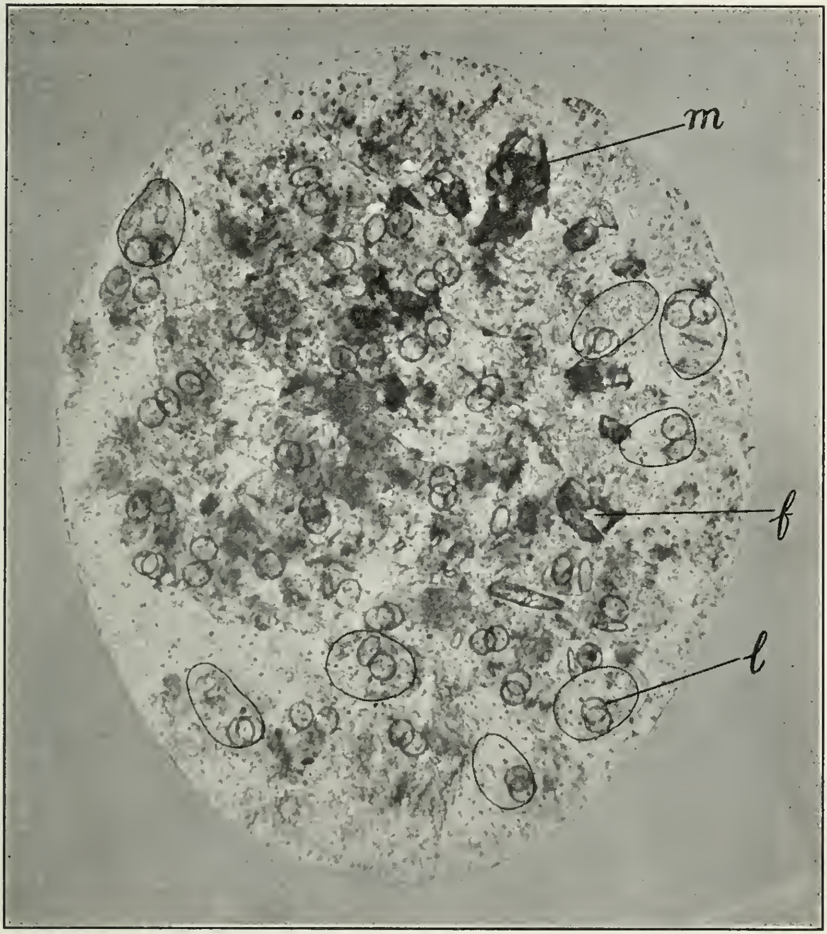
The cochineal insect was first described by Hernandez in 1651. It is ordinarily in scientific works referred to as *Coccus Cacti* Linné. In the eighth edition of the U. S. Pharmacopœia the name was changed to *Pseudococcus Cacti* (Linné) Burmeister. In a "Catalogue of The Coccidæ of the World," Maria E. Fernaldo[6] gives preference to the name *Dactylopius Coccus* Costa. In Pharmacopœial work we are justified however in using the Latin title that has been given precedent by usage, namely *Coccus Cacti,* as otherwise we might change the name with each revision as our knowledge of these insects is extended.

The cochineal insect feeds upon various species of the *Cactaceæ,* more especially the Nopal plant, *Nopalea* (Opuntia) *coccinellifera* (Mill.) S.-Dyck, a native of Mexico and Peru. It has spread into other parts of South and Central America and has been introduced into the West Indies, East Indies, Canary Islands, Southern Spain, Algeria, and is said to be found in Florida and California. Whether the occurrence in the last two places is accidental or with a view of developing the cochineal industry I cannot state.

CULTIVATION OF COCHINEAL.

The cultivation of cochineal is rather simple in a tropical climate, all that is necessary is to have the cochineal insects and the proper cacti. Senor Santiago da Cruz e Goncalves,[7] a surgeon established in Teneriffe over sixty years ago and who was appointed by the Spanish Government to superintend the cultivation of cochineal in that island, wrote an interesting article on "The Cultivation of Cochineal." This was translated with some additional notes by G. J. de Nobrega in *The Pharmaceutical Journal,* 1848–9, pp. 342–348. In this article there is also an interesting note on the Madeira Nopal as well as the cochineal insects growing on the opuntias in this locality. In a line drawing in this article of de Nobrega there is shown the stem of an opuntia on which are several broods of cochineal. The best illustrations, however, showing the Nopal plants and cochineal insects are those given in the

Fig. 3.



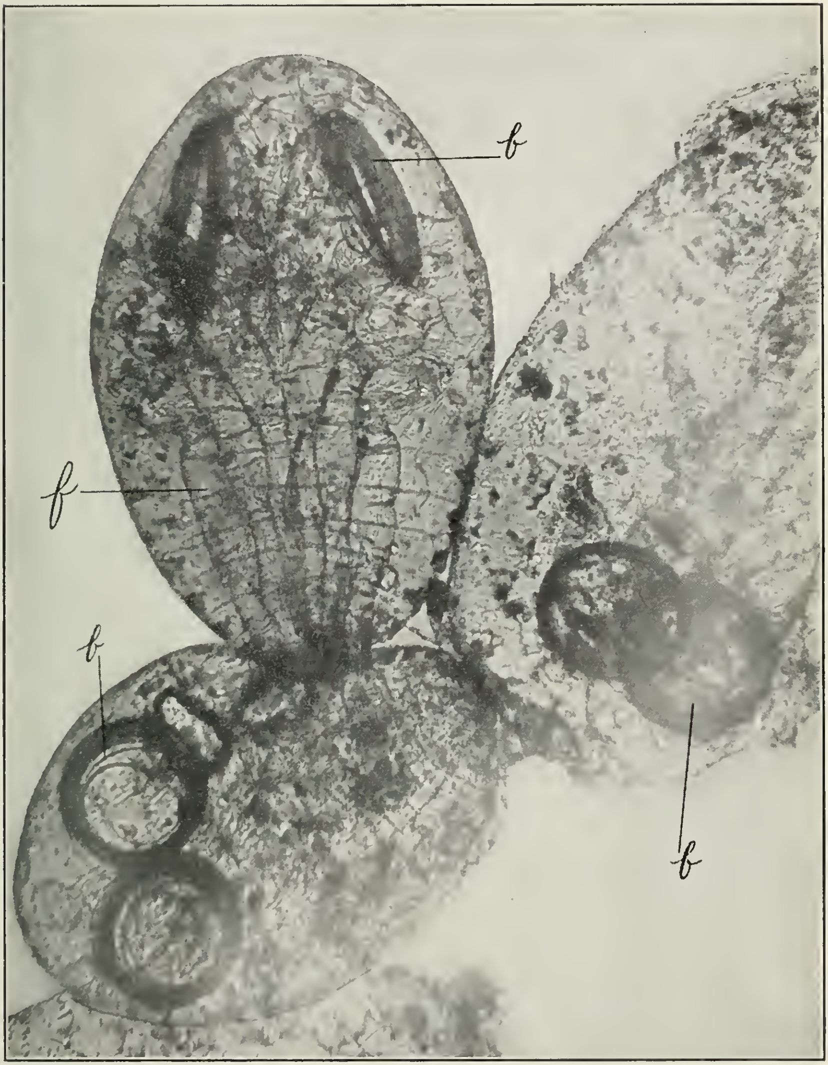
Microphotograph of cochineal insect of commerce showing: numerous larvæ (*l*) each with the characteristic beak or proboscis in the form of two dense spiral coils. The mouth part, *m*, and portions of the legs (*f*) of the mother insect are also shown.

article by Blanchard[20] already referred to. In this connection the article on "The Culture of Cochineal in India," by Dr. Roxburgh[8] in the AMERICAN JOURNAL OF PHARMACY, 1842, pp. 137–145, may be of considerable interest. C. J. Sage[17] has recently published a note on the cultivation of cochineal in the Canary Islands, from which most of our commercial supplies are now obtained. Probably the most complete work on the distribution and cultivation of the cochineal insect is by de Ruuscher which was translated into German by Mylius[9] in 1751 and is included in his work entitled "Physikalische Belustigungen." In speaking of the culture of cochineal insects he says, all that is necessary is for one to raise small nests upon potted Nopal plants growing in the house. Then when they are ready to propagate, the insects are transferred to the Nopal plants growing in the fields. In a few days the female lays her eggs, dying shortly thereafter. The young develop under the mother and when mature they creep up the Nopal stems seeking always the juiciest and greenest parts. Recently there has been published by Leon Diquet[21]an article on "The History of The Cochineal Insect of Mexico," and which contains a number of illustrations of the Nopal plantations as well as very much information concerning the cultivation of cochineal in that country.

LIFE HISTORY OF COCHINEAL INSECT.

In going over the literature we find more or less fragmentary and even contradictory accounts of the life history of the cochineal insect. The development should be further studied upon living material. The following facts based upon an examination of the literature as well as my own studies of the dried insect may be of some interest. The female insect is without wings, about 2 mm. in length and consists of from 9 to 12 segments. It is somewhat globular, becoming later distinctly ovoid. In general appearance, as it creeps over the cactus stems, it is convex on the upper, that is the dorsal surface, and somewhat flattened or concave below, that is on the ventral surface. It is covered with glaucous dust being a coat of wax. This wax is a protective secretion and is formed as a glandular secretion by the "wax pores" (Fig. 1, *w*) and wax hairs (Figs. 5 and 6), the anatomy of which has been worked out by Mayer.[10] It is therefore formed very differently in *Coccus Cacti* from the other members of the *Coccideæ*, in which it is secreted

FIG. 4.



Microphotograph of several of the numerous larvæ found in the mother insect and in which are to be seen the characteristic beaks (*b*); and the three pairs of legs (*f*) still enclosed in the sac-like membrane of one of the larvæ.

by a pair of tubular processes located in the fifth abdominal segment. The antennæ are rather short, consisting of 8 parts. The threadlike beak or proboscis, forming a sucking apparatus, is very fully developed. There are 3 pairs of legs which in the commercial article do not show more than 3 joints. Projecting from the posterior portion of the abdomen there are 2 short hairs or bristles, which are wanting in the commercial article.

The male is more elongated and ellipsoidal in outline and is provided with 2 perfectly transparent wings which reach beyond the extremity of the abdomen and cross each other longitudinally on the back. The head is distinguished from that of the female in being furnished with a rudimentary beak and with 2 long feathery antennæ. It is said that the male insect is reproduced in large numbers; the larvæ in the commercial cochineal does not show this to be the case. As a matter of fact, actually only one male is necessary for about 300 females. Upon performing their functions the male insects die and are blown away. They are therefore never seen in the commercial article.

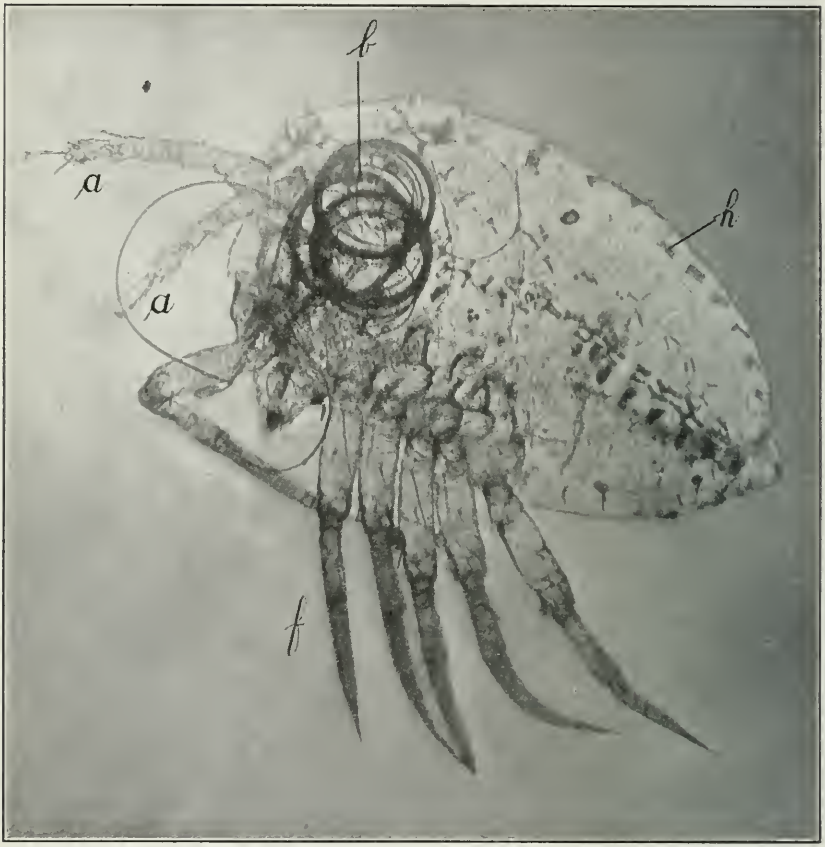
The female insect after fecundation grows larger as the young larvæ develop, becoming eventually about twice her original size. She meanwhile attaches herself to the surface of the stems of the cacti, her body penetrating into the upper layer of cells. The upper or dorsal surface becomes more or less cartilaginous in structure and more or less convex in shape. The lower surface is drawn toward the upper surface and in this membraneous cradle the larvæ are developed. It requires about eight days for the larvæ to become full grown, when they are said to resemble the parents with the exception that they are covered with a short hairy coating. In another week they attain maturity and the females of the new generation are ready to form broods in their turn. The life history of the cochineal insect is completed in about six weeks, two weeks being required for the development of the mature insect from the egg; during the next two weeks the female crawls over the fleshy stems of the cacti, the male in the meanwhile being able to fly about; then the female attaches herself to the tissues of the Nopal plants, her body becoming a membranous cradle for the larvæ of the next generation, and after which she dies. From three to five generations of the cochineal insect may be produced in a single year. The first generation usually is richer in coloring matter and is considered the most valuable. It is estimated that from an area of about an acre of Nopal plants approximately 100 kilos of cochineal may be gathered; this would represent about 14,000,000 of the membranous cradles with larvæ, or the dried insects of commerce.

THE STRUCTURE OF THE COCHINEAL INSECT OF COMMERCE.

The cochineal of commerce consists of the membranous cradle of the female which is removed by the planters from the Nopal plants. They are then subjected to steam or hot water and dried, or they may be dried by direct heat as will be referred to later. These processes it has been supposed are necessary in order to kill the female, as a matter of fact it is really the larvæ within her which are destroyed, as will be seen from the illustrations used in this paper. Before one can study the nature and structure of the commercial article, which is of a dark garnet color and very opaque, it is necessary to remove the coloring matter. This is best done by taking a convenient quantity of the cochineal, say about 10 Gm. and macerating it with 100 c.c. of water containing 2 or 3 per cent. of an alkali. The mixture is allowed to stand for an hour or so, the contents being poured over a piece of wire gauze. The insects remain on the gauze and are then washed with a few litres of water. The insects, from which the coloring matter has been partly removed, are then transfered to 150 c.c. of hydrogen peroxide solution and allowed to stand for a few hours with occasional gentle stirring. The mixture is again transferred to the gauze, the excess of hydrogen peroxide being washed off and the insects transferred to a weak alkali solution in which they are macerated for six or eight hours. The mixture is poured upon the wire gauze and washed with water until the filtrate runs practically colorless. The insects on the gauze are then transferred to dilute alcohol to which a few drops of hydrochloric acid have been added. This now renders them translucent and ready for microscopical study. They may be mounted in chloral solution or a solution of chloral and glycerin and examined.

The material which has been cleared in this way shows the cochineal insect to be a hollow vesicle of an ovoid or plano-convex shape having in the upper portion some of the remains of the mother insect (Fig. 1). The mouth part with a more or less developed beak or rostrum is always present, the beak sometimes being extended and recurved in a narrow elliptical form in the direction of the abdomen (Fig. 2). One or both of the antennæ are frequently present, showing 5 to 7 parts. The joints of the legs are usually more or less detached, the point of insertion usually only being indicated by large yellowish-brown elliptical areas. In between each of the legs on both sides are situated 2 distinct pores, resembling in form and color the point of attachment of the legs, and which are tracheæ or respiration canals. Covering the body we find on surface view numerous small groups of cells with thick yellowish-brown walls. When seen in section they are more or less conical and traversed by open canals. These have been studied

Fig. 5.



Microphotograph of larva in cochineal insect of commerce showing: outspreading antennæ (*a*) and feet (*f*); the characteristic beak or proboscis (*b*); and wax-hairs on the body (*h*).

by Mayer[10] on living material and termed by him "wax-pores." In the body of the insect, especially those in which the larvæ are very young, there are usually seen somewhat broad, more or less vermiform segments running more or less transversely or obliquely and these may represent portions of the digestive tract (Fig. 1). In the abdominal region which is very large the larvæ are borne (Figs. 1, 3), and these usually are seen to be in several stages of development.

The larvæ vary on an average from about 300 to 500 microns in length. When the antennæ and legs have emerged the larvæ are more than 1 mm. in length. When very young they are more or less ellipsoidal or ovoid and very soon are characterized by a pair of coils which are closely wound and form the beak or rostrum (Fig. 4). These coils represent the proboscis or sucking apparatus and are frequently seen uncoiled or protruding (Fig. 6) and are composed of 4 threadlike parts which pair off into 2 coils, the one surrounding the other. The inner pair of these threads forms the sucking apparatus while the outer acts as a cutting instrument. By means of this long threadlike proboscis the insect is enabled to penetrate the thick tissues of the cactus plant and obtain the necessary nourishment. The body is otherwise covered with short conical hairs about 20 microns in length, the apex being truncate. Microscopic mounts usually show in the abdominal region of the larvæ numerous crystals in the form of rods or spherical aggregates, and which are probably wax crystals. In older insects when the legs have more or less protruded the antennæ are usually more or less outspreading (Fig. 5). The legs vary from 400 to 600 microns in length and consist of from 3 to 8 segments, the lower pair having the greater number. They are provided at the joints with a few bristlelike hairs which vary from 25 to 60 microns in length. The antennæ are about 200 microns in length and consist of from 6 to 8 parts, being like the legs somewhat bristly hairy at the joints. The body of the matured young insect shows the numerous wax-pores already referred to as occurring on the mother and also in the lower abdominal region a differentiation into 9 or 10 segments (Figs. 3–5).

THE RED COLORING PRINCIPLE.

The red coloring principle, carminic acid, is found apparently altogether in the larvæ enclosed in the body of the mother insect. This is present to the extent of about 10 per cent. According to Mayer[10] it occurs in drops near the periphery of the cells of the fatty body, the drops being less numerous in the case of the male insect. It also occurs in the yolks of the eggs and in the diffuse fatty body in the new hatched larvæ. Mayer says that the pigment does not occur in the gut, but in another place he states that it moderately colors the feces, which anomaly he does not attempt to explain. It is possible that he may mean that the pigment is not found in the anterior part of the gut, but is introduced into it by the Malpighian tubules. As to function of the carminic acid Mayer has no suggestion to offer, but is of the opinion that the pigment is intrinsic and not derived. On the other hand, Krukenburg[11] considers that the carminic acid is a reserve product, basing his opinion on the theory that the female contains this principle in from 26 to 50 per cent. of her body weight. He also considered the pigment to be of a glucosidal nature, and expresses the view that glucosides are in the nature of reserve principles. But it has since been shown[14] that the coloring principle in cochineal is not a glucoside. Marion I. Newbigin[12] states that it is impossible to decide the question of the function of the coloring principle of cochineal as yet, but that the association of a pigment in the cells of a fatty body is not unknown among other insects and mentions the case of *Luciola*. Mayer also describes a colorless crystalline substance occurring in the cells containing the red pigment but does not discuss the nature of these crystals. Newbigin states that they may be urates and if so the contrast between the pigmentation of the sexes in *Luciola* and *Coccus* is striking in the extreme. As a matter of fact the colorless crystals are probably of the wax, coccerin, and are quite common in preparations made for microscopic work as has already been pointed out.

While the theory of Mayer in regard to the function of carminic acid is probably nearer the truth, Gierke[13] states that the coloring substance in cochineal is produced in the body of the insect and appears to be in the form of a uniform purplish-colored sap. He found this sap on microscopical examination to be nearly colorless and to contain numerous small purplish-colored granules to which he ascribed the color.

Throughout the literature there are very many statements that the same coloring principle found in *Coccus Cacti* is present in other species of Coccus. This is considered to be doubtful and requires confirmation. It is rather interesting to note that while the wider distribution of carminic acid in the animal kingdom is being denied it would seem that a principle resembling carminic acid is found in the flowers of horsemint, *Monarda didyma.*[16] Reference should also be made to the monograph on "Monardas" by Nellie Wakeman.[22]

COMMERCIAL VARIETIES OF COCHINEAL.

While the author of this article is hoping for fresh material with which to continue certain phases of this investigation, it should be said that there is very much that can be done by a study of the commercial article. It is rather easily prepared for examination and with the use of stains it may be possible to study the complete anatomy of the insect and distinguish the male from the female larvæ. Furthermore it is not at all unlikely that different lots will show varying development of male and female larvæ and a very great difference in tinctorial value.

There are quite a number of grades of the commercial article and it is usual to distinguish but two grades which are said to be due to a difference in the manner of killing the insects. In the so-called "Silver Gray Cochineal," the freshly collected insects are killed by heat direct; whereas the "Black Cochineal" is produced by treating the insects first with hot water, after which they are dried. It is supposed that part of the wax has been removed by this latter treatment and that the silver gray variety owes its color to the waxy excrescence. This would seem to be borne out by the fact that Liebermann[14] has reported that the silver gray variety contains twice as much wax, which he named coccerin. He found the amount of wax in the silver gray variety to vary from 1.0 to 2.0 per cent., while the black cochineal gave from 0.5 to 1.0 per cent., and in one sample 1.5 per cent. of coccerin. A specimen marked "Granilla" yielded 4.2 per cent. of wax.* While these facts are doubtless true it will be found that the coating on the gray cochineal consists chiefly of mineral matter, as was first observed by Leeuwenhoek.[2] If a few of the grains of the commercial article are heated upon a slide it will be found that the grayish coating scales off and is not destroyed by further incineration upon the lid of a platinum crucible. It is insoluble in water, chloral solution or benzole and gives a very slight effervescence with hydrochloric acid. The ash of cochineal has been reported to consist of oxides of aluminium, calcium, magnesium, sodium, potassium, iron, tin, and phosphorus, but which of these elements are naturally in the insect and which are added has not been determined. When these facts are known a qualitative test for the elements in the adulterant would be sufficient to exclude inferior grades.

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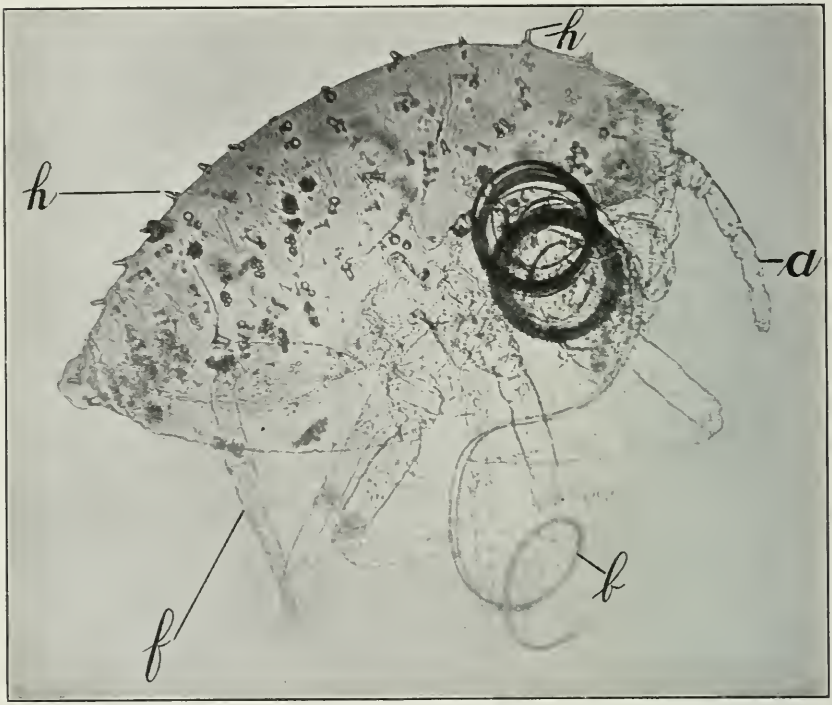
* I am inclined to the opinion that it will be subsequently found that the "silver-gray cochineal" consists of the mother insect with more immature larvæ and that in the "black cochineal" the larvæ are more fully developed.

Fig. 6.



Microphotograph of mature larva in cochineal insect of commerce showing the beak or proboscis extended and ready for penetrating the tissues of the cactus; *a*, antennæ; *f*, feet; and *h*, wax-hairs covering the body.

Gierke[13] calls attention to the fact that there is considerable difference in the quality of the commercial article, depending upon the locality in which the insects are cultivated, which crop of the season is harvested and the manner in which the insects are killed.

The most valuable variety is known as "Madres" and represents the first brood of the season. This corresponds to the variety formerly known as "Zacatillo," which was exported from Mexico.

At one time Honduras shipped the best commercial article. At the present time, according to Holmes,[15] the greater quantity comes from Teneriffe, one of the Canary Islands. Other supplies come probably from Guatemala and possibly Honduras and Mexico. At one time good cochineal also came from Vera Cruz, Java and Spain.

According to the fancy of the broker or exporter several grades of cochineal are recognized. Holmes says: "Broadly speaking, the terms 'Silver grain,' 'black grain,' and 'granilla' are used, but there are intermediate qualities variously designated as gray, black-gray, silver-gray, silver-black, rosy-black, red and foxy, and these again may be qualified by the terms fair, bold, fine and so forth. The so-called original grains consist of female and young insects, and the latter when sifted out form granilla,* which is only worth one-sixth or one-eighth of the price of the mature insect. The color is due to the mode of preparation for the market. If dried in trays in the sun, or in an oven at a moderate temperature (about 65° C.) for four or five hours, and subsequently in the sun, the waxy substance is not melted and the silver grain is the result. If they are dried at a higher temperature than 106° C., the melting point of the wax on hot iron plates, the black-grain is the result. The red tint of the rosy-black is said to be produced if they are put in bags and dipped in boiling water to kill them before drying, and that of the foxy silver grain is produced by sifting the insects when not perfectly dried so that some of the coloring matter tinges the surface. The black grain usually obtains a higher price than the silver grain. Both the black and silver grain are sometimes adulterated to meet the demand for a cheap article. The black grain is sometimes met with having the concave side filled with grains of a magnetic iron sand. The silver grain is said to be weighted with sulphate of barium or carbonate of lead and the very white appearance is given by powdered talc or other white powder."

These facts with regard to the preparation of the commercial article are given, as a knowledge of these will readily explain why all the varieties in commerce may not give the same results. Attention should be directed to the fact that the cochineal of commerce may contain extraneous inorganic substances. One will also find short isolated pieces of the spines, and fragments of the stems of the cacti attached to the mother insect.

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* The commercial variety known as "granilla" represents probably nothing more than the smaller females in which the larvæ have shown but a very slight development. It is self-evident from what has been stated in this paper that the larvæ are enclosed in the abdomen of the mother insect and could not be separated by sifting. This view is also supported by the observations of G. A. Shaw.[16]

These studies show that cochineal is the dried remains of the female insect *Coccus Cacti* (Fam. *Coccidæ*) enclosing her young larvæ. When properly cleared, the mother insect is more or less ovoid or plano-convex and for the most part nearly transparent and within her body are from about 20 to 40 larvæ in different stages of development (Fig. 1). The larvæ each have a characteristic beak or rostrum in the nature of two spiral dense coils and when mature the 2 antennæ and 3 pairs of legs are seen protruding.

I acknowledge the services of Philip F. Fackenthall for assistance in the experimental part of this paper.

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THE NEW DRUGSTORE[1]

By F. B. Kilmer

Revisiting the city where, as an errand boy, I entered service, I found but one store that had retained its former location. Of the men who, in my time, had followed this calling not one remained in the trade; they had sold out, retired, died or moved away. The stores had changed, the men had disappeared—in a few short years the old order of things had passed away.

Is not this instance typical of the general movement in our trade? The old order changes—the apothecary has gone—the doctor-shop is no more. There remain but few places that are classed as pharmacies—in their stead has come a new order of merchants—*the new drugstore.*

Standing in front of the new drugstore the calamity howler shouts:

"Pharmacy is going backward! It is retrograding! It is going downward! It is being ruined, degraded, commercialized and vulgarized!"

This sentiment is pictorially expressed in a recent cartoon, showing a customer in a store, who, beholding the bargains, the knickknacks, the bric-a-brac, the hammered brass—all sorts and kinds of wares—everything except drugs, bewilderingly asks the clerk:

"Will you be kind enough to direct me to a drugstore?"

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[1] Read at the annual meeting of the New Jersey Pharmaceutical Association, June, 1913.

It is with regret that we review the fading picture of the old shop. We long again to tread its sanded floors, see its dingy walls and its funereal furnishings. We recall the stale drug-like air, the rows of bottles, bearing mysterious names, holding mystic compounds. The old shop was the centre for gossip and loafing; "Doc," the owner, was esteemed for his wisdom and his urbanity —but all have gone their way. In their place has come a new class of men to fill the needs of a new humanity. These are the Newer Druggists, who are at the helm of the New Drugstore.

Characteristics of the New Store

The modern drugstore is not a new idea—it is merely an evolution of the shop of other days. It may be hard at times to recognize the old within the new—the time honored red globes and the long rows of golden labels have been displaced, but here and there we recognize many of the old traditions and the best of the accepted principles still remain.

The most notable change between the old and the new is the character of the wares and the business methods. Commercial pharmacy, with its hustling business systems, has quite a different aspect from the old corner drugstore. The stress of modern life, keen business competition, have made a striking transformation. We may note a few of them.

The one price system: In a store where I served for a time a book was kept wherein was entered against the name of the customer the price to be charged for articles that were most frequently purchased, and each customer had a different price. When a new customer entered he was looked over, the goods were looked at, the clerks looked wise and guessed at a price; special arrangements, secret prices, bargaining, haggling, subterfuges and extortion were the common practice.

The introduction of the one-price idea, and the education of the public up to it, has been a great moral influence in the world's commerce. For its promulgation and maintenance we are indebted to the department store of the Wanamaker type.

The prevalence and dogged retention of former customs as to prices in the drug trade, has undoubtedly fostered the deep-seated prejudice as to drugstore profits, and no doubt had much to do with the advent of the cut-rate store.

In the modern drugstore business is conducted upon a purely impersonal basis. There are no favorites—the old and young, rich and poor, are treated alike. In larger stores even the personality of the proprietor or the clerk is of but little influence in making business—it is the method that counts.

Universal in modern business is the principle that the "nimble sixpence is better than the slow shilling." Many customers—volume of business—make it possible to buy in larger quantities and obtain concessions not accorded to the small dealer. The larger store can also increase the variety of the merchandise handled, and the drugstore often expands into a department store.

The cut-rate drugstore has been but an incidental phase in this evolution—the cutter has used the inequitable prices upon patent medicines as a means toward an end. As the department store holds out bargains to attract attention, so the cutter uses low prices on popular articles to bring the customer his way. Low prices are only one factor counting toward success and it is a declining practice in the largest of our modern stores. The cutter is not a philanthropist—the chain store must make profits to exist. A manager of the latter class is on record with the statement that if it costs them 28 per cent. to do business, the profits must exceed this percentage before any dividends can accrue.

Packages all ready to hand over the counter enable the merchant to make completed sales in a shortened time, and it is interesting to watch purchasers rush in and out of the drugstore and witness sales made as rapidly as subway tickets are sold during the rush hour. This counts for volume and a lessened expense per sale.

Of vital importance in modern merchandising is service. In former days, if no customers were at hand, the druggist sat down and waited for them. It was undignified, unethical and sometimes unnecessary for the old-time druggist to advertise; everybody knew him—patrons only sought him in times of distress and in such cases were glad to seek his aid. But now he has become an advertiser—a trade developer—a pusher for business.

The development of advertising in the drug trade is an interesting study. Timidity marked its beginning. "Prescriptions carefully prepared" was about as far as the druggist would go; then came the rush of verbosity, exaggeration and generalities; space was filled with statements supposed to create a sensation, make talk and trap the unwary.

Now the value of sane, cumulative publicity is recognized; space is filled with clear, concise statements and logical arguments. Advertisements contain information that is intended to compel attention and enlist confidence of customers or friends. Honest straightforward advertising is the substantial development of our trade and our time.

That the New Drugstore does not make appeal altogether upon price, is shown by the following excerpt from a newspaper advertisement of one of them:

> "There are many good reasons that cannot fail to appeal to every thinking person, and which should make them decide in favor of our store as the most competent place to be entrusted to fill their physician's prescriptions. Only registered druggists of large experience and the highest standing are allowed to handle them. Every ingredient used is of the highest possible quality and exactly the kind the doctor ordered.
>
> "In purchasing drugs, or chemicals at our store, our customers always receive the best—not only the best as regards quality, but the best in point of store service and lowest in price.
>
> "Every drug, or chemical that we offer for sale is guaranteed to be of the highest standard, bought direct from reliable foreign or domestic producers, as the case may be, under the guarantee that they are of the finest quality.
>
> "After being received by us, samples of every article are sent to our laboratory and there subjected to critical analysis to see if they are of the required high standard. If they are, they are then sent to our counters for sale; if not, they are rejected.
>
> "That's the kind of drugs and chemicals you receive at our store."

The marked change in drugstore practice is exhibited in the window. Twenty-five years ago druggists, as a rule, made but little use of their windows; in many stores windows were small in size and their use was limited to show bottles, jars, fly specks, dirt, and litter. Some one more enterprising than his fellows put in perfumes at Christmas, paints in the Spring, sponges in Summer and licorice root when school opened. Then the patent medicine man came along, saw his chance and filled the vacant drugstore window with dope.

In those days there was no such thing as window displays; no display material, no cutouts, no dummies, no signs. Now we have window decorators, plans, designs, systems. We behold artistic, attention-arresting, sales-producing windows.

The drugstore of to-day has, or should have, an advertising manager—a promotion department from which emanates sales plans and publicity campaigns. The druggist uses pages in the newspaper; he uses billboards, street cars—any and every means by which modern business methods may be promoted to increase and hold his trade.

The New Drugstore must satisfy and hold its customers; a long-established trade, or a proud name will not suffice. A liberal policy, broad gauge methods, the spirit of a perfectly satisfying service, down to the smallest detail, are part of the life and system of the New Drugstore. Clerks, sales people, all hands in fact, must be alive; must be well versed in the goods they handle; and must be accommodating and polite. The tenor of the store's life depends on the good will of the public. Herein lies the strength of the department store and the chain store, and here is revealed their greatest weakness.

The small store can, if it will get in closer touch, gain a stronger hold; it can use what the larger store cannot use—individuality and personal strength that will win and hold patronage. The small store may flourish in spite of all the big fellows can do to prevent.

On the Side of the Consumer

The New Drugstore, in one way or another, gets on the right side of the consumer, with the result that frequently there is a shortage of standing room inside its walls. The new druggist has studied the consumer.

It is related of one astute merchant, who owns several stores, that when selecting a location he stands men at given points who count the passersby, and he makes his selection after analyzing the results. He is after possible customers in quantity and quality, and having chosen the spot has been known to pay a rental for six days equal to that paid by the old-time store for a whole year.

The customer, the ultimate consumer of drugs, has changed most strikingly as to his methods of thought, habits and life. Many things have helped to bring about this change. In twenty years the population of the United States has doubled; in the same time the readers of newspapers and magazines have been multipled by five. The new consumer knows more than he did a few years back; street railways have multiplied by ten and the users of the telephone have increased from a few hundred to many millions. This, in a rough way, shows the ability of the customer to choose the things he wants, and the source from which to obtain his supplies.

The consumer has moved rapidly from the country to the city, in turn becoming a suburbanite, and now he is going back to the land in the shape of a new farmer. The city as a place of homes is passing, and in its place are cliff dwellers in apartment houses, electric railroads and subways.

In the rural counties the new farmer has done away with the candle, the wood fire, the ox-cart and homespun clothes. His premises are electric-lighted and steam-heated; he carries his products to town in a motor car, and he makes his purchases with the aid of the telephone and the parcel post.

The New Drug Consumer is a reader and a thinker, with a new mode of thought. This is reflected in the attitude of the public mind upon problems of every kind—progressive legislation, the tariff, education, religion, public and personal morals and upon ethical standards.

As far as drugs are concerned, the average man of to-day has read more about medicine in his magazine or his newspaper than the doctor of twenty years ago learned in his lifetime. It may be for the good or for the ill of the race that every man is becoming his own physician, but the facts are that at the present day the man whom we meet on the street carries in his vest pocket a bottle of patent medicine, is versed in bacteriology, immunity, sterilization, hygiene, sanitation, diagnosis and treatment. It requires a live drug clerk to cope with the up-to-date consumer.

It is difficult to realize the rapid transformation that may take place in a generation. Changes have taken place in those elements which are directly connected with the drugstore, namely, medicine and surgery. The evolution in these arts has been more marked, more rapid, more revolutionary within the last two decades than in all the other centuries that have gone before.

The New Druggist, who no longer is content to be simply the "Doctor's Cook," has kept pace with every turn of the art. He has kept in the vanguard of the progressing age.

There has come a new humanity, a new audience—a newer, larger consumer. The old store sold only bitters and cordials—castor oil, asafetida and pills—in the new drugstore can be found commodities for every human need.

In no age has the drugstore ever been established upon a more solid, substantial basis than that upon which it stands to-day.

The New Drugstore fills the needs of its patrons and enters into the commercial and economic life of the people who enter its doors. Never did the apothecary shop attain as hearty, as far-reaching an appreciation and popularity as does the drugstore of to-day.

The old apothecary shop was visited only in times of stress, the New Drugstore is thronged with eager shoppers.

WHAT IS IN SIGHT

So many and so frequent are the changes in the trend of trade that it is difficult to forestall the next turn. A brief span of a quarter of a century has brought movements that are almost revolutionary. More and more the drugstore adds to the lines of merchandise—so much so that drugs and medicines have come to occupy only a small space in a variety of stock.

An instance is cited where a stock of drugs was moved to a small room at the side of the store. In the main part of the store there is an elaborate array of china, glass, silver, umbrellas, canes, stationery, ice cream, soda water and a host of other commodities.

The Drugstore is now considered the largest factor in handling stationery, confectionery, cigars and photographic supplies; common adjuncts are fully equipped restaurants and ice cream gardens. When the drug trade complains that the other dealers have encroached upon its province, it may reflect that it has reciprocated.

Prohibition and local option have brought a readjustment in the sale of alcoholic preparations; anti-narcotic laws have very markedly affected the sale of drugstore commodities.

In many stores the sale of liquors has been abandoned voluntarily. A druggist recently stated that he was contemplating discontinuing the sale of commodities, which must be sold under restrictions.

As expenses mount upward, the output must be increased, thus many druggists do not hesitate to take on many lines that promise profit. Sometimes the drugstore is the means by which notable successes have been achieved. The introduction of the Safety Razor was a failure in the cutlery trade—the maker took it over to the drug trade, and the result has been one of the modern marvels.

Many in the trade do not hesitate to take over lines that are ephemeral and transient and bargain days, sales weeks, demonstrations are features of the up-to-date drugstore.

More conservative merchants are inclined to be cautious in handling commodities that will tend to crowd out legitimate established trade; a passing fad—a new fashion—may bring throngs of undesirable customers.

The wise drug merchant still keeps a drugstore and branches out only in lines naturally allied. He finds a greater measure in handling commodities that require skilled handling on the part of the buyer and seller. These are the lines that give greater promise of becoming permanent and in them he is less liable to meet strong competition.

The drugstore is most closely associated with the trend of general medicine and surgery—no one has as yet written down the full measure of the progress in the practise of these arts in our day.

> "The leaves of the trees of science have been shaken for the healing of the Nations."

Our time will be forever memorable for the changes that have followed each other with such bewildering rapidity until we know not what to expect next. The Supreme gift in these days is to decrease physical suffering in man, woman and child when stricken either by disease or accident and this gift has wrought a most profound change in pharmacy and in the drugstore.

The Apothecaries' Laboratory has been demolished and in its place we see the chimneys of the manufacturer. The drugstore is the purveyor of ready-made products. Out of a few things have come a bewildering number of substances of claimed therapeutic value; fifty thousand or more of them have come from the tar barrel.

We are already walking with the vanguard of the newer Materia Medica—of "Sero Therapy"—of "Organic Therapy." Serums, toxins and antis, immunizing substances, extracts from horses, cattle, sheep, goats, dogs, rabbits, pigs, fowls, pigeons, rats and mice—fill our catalog which will soon resemble the passenger list of Noah's Ark.

Synthetic chemistry has given us delicate perfumes—dazzling colors—potent drugs.

Prediction points toward a time when the food of our tables will no longer be gathered from the fields but from the laboratory. In fancy, we may look forward toward a day when out of the test tube life itself will emerge. Man's destiny will be governed by the whirl of the benzine ring. In the drugstore of the future the shelves will need to be wide, broad and long to store the coming medicaments and appliances.

New Avenues of Trade

The modern doctor is either a specialist or a hospital attendant —in the advance of medicine and surgery the family doctor has disappeared and no one has yet arisen who can take his place.

A busy practitioner of my acquaintance says that on an average he sees his patients not more than twice and then only for a fifteen-minute session. His assistants take the blood pressure, examine the urine and note symptoms; for treatment, the patients go into the hands of an operator or nurse.

Nowadays the doctor has neither time nor the inclination to reach the intimate relations that once existed between the family and their physician.

Here may be a field for the coming pharmacist, a source of traffic for the future druggist. Why not become the advisor, purveyor and caretaker of the physical life of the race? This swings the pendulum back to the corner drugstore—the olden centre of wisdom and advice.

Preventive Medicine

One of the brightest spots in the history of the past half hundred years is the achievement of medicine. Heretofore the term "preventive" has been limited to sanitation and hygiene, as applied to contagious diseases, but now the field of its operations include every agency and influence that contribute toward man's uplift—to his moral, ethical and athletic development—his intellectual and physical perfection. The field of preventive medicine is broad and wide enough for the trained mind of the pharmacist to find a work place. It is a field that contains a clientage which will more and more demand commodities from the drugstore. Thus far this province has been inadequately manned, by self-sacrificing practitioners of medicine and philanthropic laymen—the harvest has been plenty, but the laborers have been few.

The world has been made cleaner and life safer by the martyrdom of such great heroes as Carter, Lozier, Agrimonti, Carrel, Reed and McClintoc.

> "Greater love hath no man, than that
> He will lay down his life for another."

Preventive medicine cannot reach its ideal through the labors of the physician. The physician is trained to diagnose and treat disease—that is all that should be expected of him. To ask a physician to lay aside his life work and engage in a limited way in solving the problems of preventive medicine is to restrict his usefulness and to wrest him from his high calling.

Doctors have, up until now, acted as Health Officers in the community in which they have lived. They have done noble work, but in many instances they were wholly unfitted to perform the duties that the position demanded and time thus given was a loss to their patients and to their profession.

Now we know that every community needs as health executive a broad-minded, trained man; a leader—an educator, who will act as superintendent of health. For such a work few of the ablest physicians, or surgeons are suited, but into it a pharmacist may find a foot-hold.

Consider a few of the activities of preventive medicine:

The prevention of communicable and epidemic diseases.

The elimination of disease-producing features from industries.

The prevention of infant mortality.

Teaching and impelling sanitation, hygiene in personal habits and regard for one's fellows.

Mental hygiene.

Does not this suggest innumerable openings for the practice of pharmacy and for promotion of trade?

A writer tells of a house, constructed in such a way, that the germs of disease can enter only with difficulty and if by any chance they should enter it may be easily cleaned—a disease-proof house is the coming dwelling. Who better than the pharmacist or druggist could equip and maintain such a structure? Soaps, disinfectants, insecticides, dustless dusters, fumigators, sputum cups, scrubbing brushes, lotions and solutions—a host of things from the drug shop will be consumed by the inmates of the new diseaseless home.

The progress of preventive medicine is advanced by means of education, which means publicity and advertising. Who, then, better than the druggist, can lead in the movement against the Great White Plague—the Great Black Plague? Who, better than he, is fitted to use printers' ink to spread the gospel of health and to supply the needs that the propaganda will create?

PURE FOOD

A phase of the newer mode of living is the movement for purer and better food. The drugstore is the purveyor of food stuff for infants and invalids—why not distribute all kinds of food for all classes of patrons? Packets of pure milk, pure water and pure food can be dispensed as readily as malted milk or candy; certified milk, pasteurized milk, guaranteed milk, involve both chemistry and pharmacy.

SURGERY

Many of us who are not yet old can appreciate the evolution and the revolution of surgery in the two or three decades just past. It has moved forward a thousand years in a day. Procedures, startling in character and far-reaching in result, have followed each other in quick succession.

The period ushered in by Pasteur and Lister made a rapid flight from crude antisepsis to asepsis, and in its passage left its impress upon pharmacy and trade. Dressings, apparatus, instruments in new forms and kinds have been evolved and as an outcome the drugstore has developed a most notable trade in cottons, bandages, gauzes and numerous types of dressings. To-day we see the opening of the most brilliant chapter in the history of surgery—we seem to stand in the morning light of a new era.

The dominant idea of the Listerian doctrine has been to prevent the development of bacteria in wounds and to remove the products of infection. Now, the natural resources of the patient are to be considered—he is made to manufacture within himself phagocytes, opsonins, antibodies. The surgeon does but little—the resources of the patient are developed and his tissues can manage infection better than the knife or antiseptics ever did. The surgeon guides—nature heals. Wonderful tales are told of the wizards of surgery, with their operations, grafting, splicing, trans-planting of organs from one animal to another, of the causing of new cells, new tissues, new limbs to grow. No one can predict the outcome of the wondrous work of Carrel and of his followers, but we can believe that the drugstore will always be the mecca for surgical supplies.

FIRST AID

First Aid to the Injured is not of modern origin. The recent past has seen a development that is now reaching a high degree of efficiency. First Aid, to-day, is quite different from the early efforts to mitigate the horrors of war. First Aid does not, as is often supposed, train workers to become surgeons, doctors and nurses. It is an educational, humanitarian movement—the dominant purpose of which is to instill in the mind what to do in an emergency or while waiting for medical aid.

Druggists, as a class, have but little comprehension of the development of this movement. The National Government, municipal bodies, civic organizations, schools, Y. M. C. Associations are now practical training schools in the First Aid to the Injured movement. Railway Systems, mining companies, factories, city departments have First Aid Systems in working order. Abroad the movement is very far reaching. In this country it is estimated that, through various channels, a million people are every year acquiring a practical knowledge of the subject. As the soldier has long carried on his person a First Aid Packet—the up-to-date mining and railway employe now does the same. In many transportation systems every car, engine and caboose—every boat carries a quota of supplies and so likewise does the motor car. First Aid has become universal—the time seems to be approaching when people in every walk of life will carry on their person some form of an appliance for the care of an injury. This movement is creating a demand for materials that is within the province of the druggist to supply.

THE NEWER PHARMACY

In the past pharmacy has been identified with every great advance in civilization. It has been foremost in the progress of medicine and science, and from its ranks have come great physicians, physicists and scientists.

Halberg divided pharmacy into four periods:

First Period: The Organic—or Plant and Animal Period of Hippocrates to Galen.

Second Period: The Alchemic—or Period of the Philosopher's Stone and Confection of Trismegistus to Geber and Basil Valentine.

Third Period: The Iatrochemic—or Period of Medical Chemistry of Paracellus to Scheele.

Fourth Period: The Atomic—or Quantitative Period of Dalton, Lavoisier and Berzelius.

Rapidly advancing we see a Fifth Era—it is not yet formulated or defined, but it is being shaped out of a new philosophy. We catch glimpses of it in newer physics, in radio-activity, physical chemistry, biology and in many new pawns on the chess board of man's struggle with nature.

Modern progress is planted firmly upon machinery—the steam engine—the steam ship—the dynamo—electric communication—the printing press—the conquest of the air—these and all manner of mechanical devices have bred a humanity with larger and higher aims.

There is at hand a new industrial order—the barriers between creeds, race and nations are being broken down—people of all lands are being brought together into a conscious solidarity. There is before us a scientific organization of industry, of politics, of morals—in brief—the whole scheme of our daily lives. From this must come the rehabilitation of the whole machinery of production and destruction. The world will not go backward—this opening century will see a movement forward far greater than the many millions that have gone before.

Pharmacy in the past has moved forward with or in the vanguard of scientific advancement. The foundations that have been laid in the achievements of the historic past are secure. Is it now going backward? Shall it go backward? Will the drugstore keep pace with the advancement of pharmacy—the trend of science, or will it separate from it? Will the drugstore have a place in the new made world, or will it disappear from sight?

THE DRUGSTORE THAT IS TO BE

Every age has its demands—its own work to do. Pharmacy can never again have its Parcellus, Galen, Hanbury, Squibb, Maisch, Procter, Rice or its Hallberg—for there will never be the need for nor the place for them.

To-day we have our Kraemer, Remington, Lloyd and Beringer and they will pass away and new masters come forth to meet the newer, higher needs.

The old drug shop has passed away and the world will never call for its restoration. In its place is the New Drugstore, which is moulding and shaping itself to fill its place in the life of to-day. Out of the old that has disappeared—out of the new that now is—we may form visions of the drugstore that is to come. Faintly these visions take their shape.

The future drugstore need not be a chain store nor a trust. Its place, its worth and its success will not be measured by square feet nor acres of floor space, nor its massive buildings, capitalization nor ample stocks.

The present drugstore better than the one which preceded will in turn be supplanted by one better still. It may be an evolution of the type of thousands that exist here to-day, but it will be a store that aims at the highest standards—it will be a place of business—a commercialized pharmacy—or it cannot exist. And it will meet and conquer competition in character—not in underhand methods or cut prices. It will give a higher—a better—an ever-growing service. It will fill every need of the age in which it may live and of the humanity which it may serve.

THE DETECTION OF CANE SUGAR IN HONEY.[1]

By Charles H. LaWall.

By the above (query) I suppose is meant the detection of *added* cane sugar in honey, for it is an established fact that sucrose normally exists in cane honey to the extent of as high as 8 per cent., which is the maximum amount permitted by the standards of the U. S. Department of Agriculture.

There are no color reactions or simple chemical tests for the differentiation or distinction of any of the sugars and these are detected only by inferential tests based either upon the reducing power before and after inversion or by the optical activity under similar circumstances. As sucrose is chemically the same whether normally existing in the honey or in the shape of cane or beet sugar and as it is the amount rather than the actual presence which decides the genuineness of the article, the only tests of value are the quantitative tests, even were qualitative tests possible, which they are not.

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[1] Read at the annual meeting of the Pennsylvania Pharmaceutical Association, June, 1913.

The best method for the determination of cane sugar is by the use of the polariscope and the use of an algebraic formula in connection with the figures obtained for the optical rotation before and after inversion, observations being made at the same temperatures.

By inversion, of course, is meant the hydrolysis of sucrose which, when heated with diluted acids, is converted into dextrose and levulose, the levulose being in excess and the mixture of the two resulting sugars therefore possessing a levorotatory power in contradistinction to the dextrorotatory power of sucrose.

As honey consists largely of invert sugar (from 50 to 80 per cent.), and as invert sugar is readily prepared from cane sugar in large quantities, it seldom happens that such a clumsy method of adulterating honey as by the addition of cane sugar direct is practised, when it is possible to convert the same sugar into invert sugar and thus simply add a sugar which is normally present in the honey. Invert sugar, like sucrose, is the same chemically, whether existing naturally or prepared artificially from sucrose, and it would be impossible to detect added invert sugar in honey were it not for the fact that in the process of inversion by any of the artificial methods, a small amount of furfuraldehyde is produced, and as furfuraldehyde is never present in genuine honey and as it can be detected in very minute amounts and with as great certainty as is the case with formaldehyde, it is customary to apply a test for the presence or absence of furfuraldehyde before deciding whether a honey is or is not genuine, even if the proportions and kinds of sugars are normal.

Such a test was years ago devised by C. A. Browne[2] and is as follows:

> Treat 5 Cc. of a 1 : 1 solution of the honey in distilled water, in a test tube with 2 Cc. of aniline acetate reagent (freshly prepared for the test by mixing 5 Cc. of aniline and 5 Cc. of water and adding just sufficient glacial acetic acid to make a clear solution), allowing the reagent to flow into the tube gently so as to form a separate layer upon the honey solution. If the

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[2] U. S. Dept. of Agriculture, Bureau of Chemistry, Bulletin 110, p. 68.

tube be then gently agitated so as to slightly but not entirely mix the two layers a red ring or zone will be produced at the point of contact if furfuraldehyde be present, indicating the presence of added invert sugar.

Unfortunately this test is not infallible, for when pure genuine honey is heated (as, for instance, in the process of clarification when heat is sometimes used), furfuraldehyde is also formed and the test is of no value therefore unless applied to honey which has been known to never have been heated.

In conclusion I would say that it is not possible to detect cane sugar in honey in the sense of a qualitative test; that, as cane sugar is normally present in small amounts, its quantitative determination, preferably by means of the polariscope, becomes necessary; that the form in which sugar is added usually is that of invert sugar which can be readily detected in honey which has never been subjected to heat.

A RAPID ACCURATE METHOD FOR THE QUANTITATIVE ANALYSIS OF ZINC OINTMENT.[1]

By Joseph L. Mayer.

In testing some samples of Zinc Oxide Ointment recently, it appeared to me that the analytical methods now in use were too involved and time-consuming for the pharmacist; I therefore devised the following very simple and accurate process:

Into a tared porcelain crucible accurately weigh 1 gramme of the sample, heat cautiously until the material bursts into flame, allow to burn quietly until all inflammable material is consumed, then heat strongly with the Bunsen burner until all organic matter is burned off, cool and weigh.

Should difficulty be experienced in burning off organic matter, moisten with a drop of nitric acid, heat cautiously to avoid spattering, and then with the full flame as before.

Since 1 gramme of the sample is taken the residue which is oxide of zinc can easily be computed into percentage by multiplying the result by one hundred.

Of course, if necessary, this result can be checked by determining the zinc in the residue volumetrically, gravimetrically, or electrolytically and calculating to oxide.

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[1] Read before the New York State Pharmaceutical Association, June, 1913.

There does not appear to be any reason why the method cannot be employed with equally good results for the analysis of Zinc Stearate Ointment. In this case the amount of stearate present could easily be calculated from the residue, which is zinc oxide.

The method, in addition to being rapid, is accurate and easily applied.

A NOTE ON AQUA CAMPHORÆ.[1]

By John K. Thum, PhG., German Hospital, Philadelphia.

Those of us who have occasion to make considerable quantities of camphor water are conversant with the shortcomings of the present official method. The method consists in dissolving 8 grams of camphor in 8 cubic centimetres of alcohol, triturating the solution with 15 grams of purified talc, allowing the greater part of the alcohol to evaporate spontaneously, continuing the trituration with distilled water to make one litre and filtering through a wetted filter.

By this method, after a few days, the preparation begins to get cloudy and shows unmistakable signs of fungus-like growth. Although the statement appears in some of the literature relating to camphor that it is soluble in water to the extent of two grains to a fluidounce, it is not true and is readily disproven; if it were true fungi would not appear, as camphor is somewhat antiseptic.

The U. S. P. states that camphor is "sparingly soluble" in water, and, as practice bears out this statement, it follows that in the present U. S. P. method for making the water practically all of the camphor remains on the filter with the talc. It seems to the writer that the combination of alcohol and camphor causes some of the talc to go into solution and as the alcohol, or the greater part of it, gradually evaporates after the lapse of time, the talc is thrown out of solution. That camphor water prepared by this method shows up clear when first made is true, but only for a short time, then, as stated before, cloudiness appears which necessitates frequent filtration. To a busy pharmacist this is an annoyance.

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[1] Read at the meeting of the Pennsylvania Pharmaceutical Association, June, 1913.

We are desirous of having at all times on hand a clear, saturated solution of camphor in distilled water and we obtain it by applying the pharmacopœial method for making chloroform water to the preparation of our camphor water. To put it concretely:

Camphor (in small pieces)	8.0 grams.
Distilled water	ad 1000.0 c.c.

We make four litres at a time. When our dispensing bottle needs replenishing we simply fill it from the stock bottle, first tying a piece of sterile gauze over the mouth of the stock container to prevent the camphor from going over. This water remains clear indefinitely.

That camphor water made by this method contains at all times camphor to the point of saturation can readily be determined by mixing an equal part of it with a 50 per cent. solution of magnesium sulphate when a rather copious precipitate of camphor makes its appearance.

THE SIXTY-FOURTH ANNUAL SESSION OF THE AMERICAN MEDICAL ASSOCIATION.

The meeting of the American Medical Association for 1913 held in the city of Minneapolis, June 17, 18, 19 and 20, was more successful and much better attended than had been anticipated, either by the officers of the Association or by the members of the several local committees. The registration of members aggregated 3200 and this, with the rather novel arrangement of having all of the meetings held on the University campus, insured a liberal attendance at all of the sessions of the fifteen sections of the Association.

The programme of the scientific work of the several sections was well up to the high standard previously established, and the list of papers with abstracts required a book of 168 pages to present.

As had been foreshadowed by the interest previously evidenced, the subject of medical education was freely discussed, both in and out of meetings. The report of the Council on Medical Education presented a rather comprehensive survey of the work of the Council during recent years and called particular attention to the fact that from a total of 166 medical schools in the United States in 1904, the total number has been reduced to about 110 at the end of the present college session, despite the fact that several state universities have organized medical departments during recent years. The total number of schools closed since 1907 by merger or otherwise is given as sixty-five, and the opinion is offered that this decrease in the number of medical colleges has not been to the detriment of medical education but to its advantage. It has not removed or lessened the opportunities of students to study medicine, but has resulted in giving them better opportunities. The question of medical education was also referred to by George Edgar Vincent, President of the University of Minnesota, in his address of welcome. He complimented the American Medical Association on the excellent work done under its auspices to bring about proper recognition of laboratory and hospital instruction and to call attention to the need of medical research. He also pointed out that a cheap medical education is the most expensive for the community and that the frequently made plea that individuals should have a right to a short and easy road to professional practice should not be seriously considered.

The work of the Section on Pharmacology and Therapeutics is perhaps of more direct interest to pharmacists than that of any of the other sections primarily because matters of pharmaceutical interest are usually discussed in this Section and also because of the fact that delegates from the American Pharmaceutical Association are received by this Section. This year the American Pharmaceutical Association was represented by Prof. Joseph P. Remington, Dr. Bernard Fantus, and Prof. F. J. Wulling. Prof. Joseph P. Remington, the Chairman of the delegation of the American Pharmaceutical Association, in presenting felicitations, said in part:

> "The American Pharmaceutical Association sends greetings to the American Medical Association and best wishes for a most successful meeting at Minneapolis. During the last three years the national organizations have been more closely brought together through Pharmacopœial revision work, members from both organizations working in their several departments on the Ninth Revision.
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> "It was to be expected that differences of opinion would arise, and it is gratifying to know that during the three years of earnest discussion and official correspondence, personalities have been conspicuous through their absence. The principal debates have been on the question of scope, some of the medical members arguing for a more restricted list; others desire an extended list, but the majority of the members of the Revision Committee are undoubtedly in favor of adopting neither a restricted nor extended list, but one which they believe will be satisfactory to the largest number of practitioners in America. It will be interesting to know that about 85 per

cent. of the manuscript of the Ninth Revision is nearly finished and the work of getting it ready for the press will soon begin.

"The American Pharmaceutical Association has been very active through its branch organizations, and its own legislative committees in advancing legislation tending to control the extensive use of narcotics and in preventing as far as possible the further development of evil practices of unworthy members of both professions. It is sincerely hoped that our national bodies will continue to work in the future on lines which will draw both together and ignoring small and unimportant details and differences, will stand shoulder to shoulder in advancing legislation which shall secure to suffering humanity the greatest uplift that is possible."

This address was well received by the members of the Section, and in further discussing the scope of the Pharmacopœia, Dr. Torald Sollmann, of Cleveland, offered the following preamble and resolution:

"Whereas, It is desirable that the articles officialized by the Pharmacopœia of the United States should reflect the progress of therapeutics; and

"Whereas, Therefore the inclusion of articles in the Pharmacopœia now in progress of revision should be determined by their therapeutic merit; and

"Whereas, The decision of therapeutic questions should logically and in fairness be left mainly to the medical members of the Revision Committee; therefore, be it

"*Resolved*, That the section request the House of Delegates of the American Medical Association to urge on the Committee of Revision of the Pharmacopœia of the United States that the selection of articles to be included be left to the Committee on Scope, in which the medical profession has a majority representation, rather than to the Executive Committee, which represents mainly the pharmaceutical profession, and which has overridden half the changes advocated by the Committee on Scope."

This resolution was discussed at some length and was finally adopted, referred to the House of Delegates, and was later concurred in by that body.

The address of the Chairman of the Section, Dr. Ray L. Wilbur, of San Francisco, California, was devoted to a practical discussion on the teaching of therapeutics, and a paper by Torald Sollmann, of Cleveland, entitled "Yesterday, To-day and To-morrow: the Activities of the Council on Pharmacy and Chemistry," discussed the aim of the Council in bringing about a necessary change in the attitude of physicians toward materia medica products generally. He also referred to the new book on useful remedies to be published under the auspices of the Council, and ventured the opinion that this book would go far toward bringing about a change in the relation of physicians and pharmacists.

The quality of the drugs furnished to patients was discussed in a paper by W. A. Puckner on the "Quality of Drugs Sold to Dispensing Physicians," and in a paper by M. I. Wilbert on "Carelessness in the Pharmacy as a Reason for a Restricted Materia Medica." The following preamble and resolution designed to bring about greater activity in the enforcement of existing laws relating to drugs and medicines was adopted by the Section, referred to the House of Delegates and concurred in by that body:

> "WHEREAS, It has been repeatedly shown by the Council on Pharmacy and Chemistry, and by the Chemical Laboratory of the A. M. A., as well as by other investigators, that many drugs and preparations used in the treatment of diseases are of unreliable composition, through carelessness, negligence, ignorance and other reasons; and
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> "WHEREAS, This condition of affairs is against the interests of public health and the progress of the science of medicine; therefore it is evident that greater activity is needed in the enforcement of existing laws relating to drugs and medicines; therefore, be it
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> "*Resolved*, That the Section on Pharmacology and Therapeutics requests the House of Delegates of the A. M. A. to bring this matter to the attention of the proper federal and state authorities, and urge on them the need for more energetic and effective action in this direction."

A comprehensive paper on "The Physiological Testing of Ergot," by A. C. Crawford, of Palo Alto, California, was presented in abstract and will no doubt appear as a part of the proceedings of the Section. The remaining papers presented before the Section were largely of interest from a practical therapeutic point of view, and included contributions on the treatment of various pathologic conditions by the use of drugs. A symposium on physical therapeutics included discussions on hydrotherapy, the use of radium and the use of the Roentgen rays as therapeutic measures.

One of the more interesting features of the programme was a symposium on serums and vaccines in a joint meeting with the Section on the Practice of Medicine. The papers presented included a discussion of the federal control over the manufacture of serums and vaccines by Dr. John F. Anderson, of Washington, D. C.; the treatment of pneumonia by specific serums by Rufus Cole, of New York; the treatment of lobar pneumonia with partially autolyzed pneumococci and pneumococcus extracts by E. C. Rosenow, Chicago; anti-streptococcus serum, by George H. Weaver, Chicago; and a report on typhoid vaccination in the Army in 1912, by Frederick F. Russell, Washington, D. C. These several papers contained considerable information of a practical character and, with the resulting discussion, constitute perhaps the most conservative statement with regard to the possibilities and limitations of serums and vaccines that has recently been presented.

The officers of the Section for the coming year are: Chairman, J. F. Anderson, Washington, D. C.; Vice-Chairman, Robert Hatcher, New York; Secretary, M. I. Wilbert, Washington, D. C.; Delegate, Ray L. Wilbur, San Francisco, Cal.; Alternate, Reid Hunt, Washington, D. C.

Dr. Victor C. Vaughn, of the University of Michigan, Ann Arbor, Michigan, was selected as the President-elect of the American Medical Association, and the next meeting of the Association will be held in Atlantic City in June, 1914.

M. I. Wilbert.

PHILADELPHIA COLLEGE OF PHARMACY.

Minutes of the Quarterly Meeting.

The quarterly meeting of the Philadelphia College of Pharmacy was held on June 30, 1913, at 4 P.M., in the Library.

In the absence of the Secretary, Jacob S. Beetem was appointed Secretary pro tem. The minutes of the annual meeing held March 31st were read and approved. The minutes of the Board of Trustees for March, April and May were read and approved.

The Committee on Membership, Professor Charles H. LaWall, chairman, reported that the conditions were about the same as last year, and that continued efforts were being made to add to the membership of the College.

The Committee on Necrology: Professor Henry Kraemer, Chairman, reported that during the year six members had died—one honorary and five active. Obituary sketches had been published of five in the Journal, and that the July issue of the Journal would contain notices of Mr. Ridpath and Mr. Estlack. The following is a list of those deceased: Oscar Oldberg, Alexander H. Jones, William McIntyre, Florence Yaple, John W. Ridpath and Horace W. Estlack.

The delegates to the meeting of the Delaware Pharmaceutical Association, Professor C. B. Lowe, Chairman, reported that all the delegates appointed attended the meeting, which was held at Wilmington, June 5th. Mr. Challenger, of New Castle, presided. Reports of various committees were presented, one of the most interesting being that on "Adulterations," by H. K. Watson, of the Delaware State College. The State Pharmacy Board presented a report of their work for 1912. Delaware now exchanges certificates with Maryland, and possibly with several other States. The report advocated examination and registration by a National Board and that certificates from this Board be recognized in all the States.

The delegates to the meeting of the New Jersey Pharmacutical Association made a verbal report by the chairman, George M. Beringer. The meeting was an unusually pleasant one, the delegates being welcome and accorded every privilege, and as usual the graduates of the College presented papers and took an active part in the discussions. Professor Kraemer supplemented the report by adding that Mr. Beringer presented a report of his work as a member of the U. S. P. Revision Committee. He also presented a paper on Magma Magnesia and one on Elixir Ferri et Quinia et Strychnia Phosphatis. He said considering the amount of work accomplished in the reading of reports, number of papers read and the entertainment features, the meeting was one of the best he ever attended.

The delegates to the meeting of the Pennsylvania Pharmaceutical Association, Professor C. B. Lowe, Chairman, reported that the 36th annual meeting was held at Forest Park, Pike Co., June 24, 25, 26. The informal opening was held on Tuesday morning, at which time delegates from other associations were welcomed. The formal opening was in the evening when the Association was welcomed by Rev. B. F. Apple, of Stroudsburg. The gentleman, though 81 years of age, made a pleasing and spirited address, which captivated the audience.

The Procter Memorial Committee suggested a plan of action for pushing the matter by the American Pharmaceutical Association, and also presented photographs of a proposed monument. The report of the Committee on Trade Interests was a specially notable one. Buena Vista Springs was chosen as the next place of meeting. The officers elected were R. H. Lackey, President; Charles R. Rhodes, First Vice-President; George J. Durbin, Second Vice-

President; Edgar F. Hefner, Secretary; F. H. E. Gleim, Treasurer. W. J. Sturgeon is the new member of the Executive Committee.

The State Board of Pharmacy made an interesting and valuable report, in which it was stated that 90 per cent. of the graduates of the Philadelphia College of Pharmacy had been successful in the examinations held by the Board in the preceding year. The chairman of the Committee on Papers and Queries, Professor F. P. Stroup, presented, as usual, a large number of important papers, about 40 in all, thus keeping the Pennsylvania Association in the van of all other associations in this important work. The entertainment, as usual, was varied and enjoyable.

The President appointed the following as delegates to the meeting of the American Pharmaceutical Association to be held at Nashville, Tenn., August 18: Prof. Joseph P. Remington, chairman; Prof. Henry Kraemer, Prof. C. B. Lowe, George M. Beringer, Prof. E. F. Cook, with power to appoint three of their number as members of the House of Delegates. Professor Henry Kraemer submitted the names of five gentlemen for Honorary membership, which, according to the rules, lie over for action till the next meeting of the College.

The Registrar submitted the name of an associate member for election to active membership. The application was referred to Committee on Membership. The diploma of Mr. Schively, of the class of 1842, was presented to the College by Mr. B. C. Clapham.

Professor Henry Kraemer reported having received from Doctor Jose L. Alacan, of the University of Havana, two handsome coffee plants. The thanks of the College were rendered both the donors.

Professor Henry Kraemer presented a number of photographs and a portrait of Miss Florence Yaple (a life member of the College, and long associated in the management of the AMERICAN JOURNAL OF PHARMACY). This portrait was made from a photograph taken by Professor Kraemer several years ago and was painted by her friend, Miss Florence Newton, who made the portrait of Dr. Susan Hayhurst, presented to the College in 1911. He asked that the portrait of Miss Yaple be hung in the ladies' room of the College; so ordered.

Mr. Beringer called the attention of the meeting to the fact that at this time the Revision Committee on Essential Oils of the U. S. P. were in session at the College, and suggested we invite the gentlemen to meet the members present. This was favorably received, and later the Dean presented Professor C. Lewis Diehl, Dr. Charles Caspari, Jr., Mr. Otto Raubenheimer and Dr. John M. Francis. The President welcomed the gentlemen, who, in turn, responded.

Jacob S. Beetem,
Secretary Pro Tem.

Abstracts from Minutes of Board of Trustees.

March 4th, 1913.—Eleven members present. Committee on Library reported that during the past two months 825 books were accessioned, and a number of volumes were donated: 244 persons consulted the Library. Committee on Examinations reported that Frank N. Moerk has complied with all the requirements and was entitled to a Certificate of Proficiency in Chemistry; after a ballot had been taken it was ordered that a certificate be awarded. The resolutions prepared in memory of William McIntyre were read, and, on motion, it was ordered that they be entered on the minutes and an engrossed copy be sent to the family.

April 1st, 1913.—Eleven members were present. A communication was received from the Secretary of the College announcing the election of officers for the ensuing year and the election of three trustees for three years. This being the time for the reorganization of the Board, Mr. George M. Beringer was re-elected Chairman, Mr. Walter A. Rumsey, Vice-Chairman, and Mr. Jacob S. Beetem, Registrar for the ensuing year.

Committee on Library reported 256 books accessioned during the month and a number of volumes donated; 197 persons had consulted the Library. The Special Committee on Educational Matters reported verbally, and the subject was left in their hands.

The Standing Committee for the year were appointed with the following members as chairmen: Property, Howard B. French; Library, Samuel P. Sadtler; Museum and Herbarium, O. W. Osterlund; Finance, Howard B. French; Supplies, H. K. Mulford; Accounts and Audit, C. A. Weidemann; Instruction, George M. Beringer; Scholarships, Joseph P. Remington; Examination, W. L. Cliffe; Theses, Joseph W. England; Discipline, Howard B. French; Commencement, Walter A. Rumsey; Announcement, Samuel P. Sadtler; Alumni, Joseph W. England; Appropriations, the chairmen of all committees empowered to make expenditures, with the Chairman of the Committee on Finance, the Chairman of the Board and the Treasurer.

Communications were received from all upon whom the degree of Master in Pharmacy will be conferred, expressing their appreciation of the honor.

Membership Committee reported favorably on the application for active membership of E. G. Eberle, of Dallas, Texas, and Charles C. Sniteman, of Wisconsin, whereupon a ballot was taken and they were unanimously elected.

April 22nd, 1913.—A special meeting of the Board was called by written request of five members thereof. The chairman explained the reason for the call was due to articles published in one of the drug journals of recent date. Several of the members who could not be present expressed their views in writing, and a lengthy discussion followed, participated in by a number of those present; the matter was referred back to a special committee with power to act.

May 6th, 1913.—Seventeen members were present. Professor Moerk was invited to be present during the discussion on the report from the Committee on Instruction. The committee had held many meetings during the winter and spring, and earnest consideration had been given to the question of improving the curriculum and working out methods by which the student shall obtain the best results from the advantages which the courses of instruction afford. The committee think it inadvisable to make any change in the three-year course, as given since 1895. The desirability of increasing the total number of hours of instruction in the three years' course of the College to at least 1800 hours was reported upon. To accomplish this a number of changes have been necessary and were recommended for consideration. The proposed changes were read by sections and after a lengthy discussion were adopted with some modifications. The recommendations were as follows:

First.—Eliminating the supplementary course and making it part of the regular course. Adopted.

Modified Roster referred back to Committee with power to act.

Second and Third.—Recommend continue course of special lectures. Adopted.

Fourth.—Special lectures during the course to be approved by the Committee on Instruction. Adopted.

Fifth and Sixth.—Department of Bacteriology, Hygiene, Urinology and Serology. Adopted.

Seventh and Eighth.—Compensation to Professor of Bacteriology was referred to Finance Committee. The fee of the optional course for special students was fixed at twenty-five dollars.

Ninth.—Committee on Instruction to confer with the Professor of Bacteriology relative to equipment. Adopted.

Tenth.—The sub-committee to co-operate with students in the interim between college courses. Adopted.

Eleventh.—Outlines a plan covering deficiencies. Adopted.

Twelfth and Thirteenth.—Improvements in one of the laboratories was referred to Committee on Property.

Fourteenth.—Professor Kraemer's selection of Mr. P. F. Fackenthal as Instructor in Pharmacognosy was approved.

Fifteenth.—Professor Kraemer was authorized to engage a student assistant upon terms suggested.

May 13th, 1913.—Adjourned meeting. Sixteen members were present.

The Committee on Instruction made a supplemental report recommending that the changes necessary in the Roster be approved. Adopted. Also recommending that Professor C. B. Lowe be made Medical Examiner in the Department of Physical Education, and that Mr. W. Ward Beam be made Director of the Gymnasium and Instructor of Physical Training. Adopted.

Committee on Examinations reported the names of those who had successfully passed the examinations for the degree of Doctor in Pharmacy, and also for those for the degree of Pharmaceutical Chemist; a ballot being taken, they were declared elected to receive the degree.

The names of those who were entitled to receive prizes were then read, and approved, and the chairman appointed various members of the Board and Faculty to present the prizes at the coming commencement. Mr. French reported that the Hon. William E. Humphrey, of Seattle, Washington, would speak at the Commencement Exercises; that Rev. Edwin T. Carson would offer the prayer, and that Rev. David M. Steele would deliver the Baccalaureate sermon to the graduating class in St. Luke's Episcopal Church.

The Committee on Membership reported favorably on the application of Mr. John R. Rippetoe, of New York City, for active membership; a ballot being taken, he was unanimously elected.

NOTES AND NEWS.

Historical Medical Museum for London.—The ceremony of opening the Historical Medical Museum organized by Mr. Henry S. Wellcome, was performed on June 24th by Dr. Norman Moore, President of the Section on History of Medicine of the forthcoming International Medical Congress, and the new Institution received the benediction of Sir Thomas Barlow, President of the London Royal College of Physicians and of the International Medical Congress, Sir Frederick Treves, Sir Rickman Godlee, President of the London Royal College of Surgeons, and Sir Francis Champneys, President of the Royal Society of Medicine.

The idea of forming a museum illustrating the history of the healing art was first conceived and organized by Mr. Wellcome several years ago, and a remarkable collection of rare and curious objects of historical interest connected with medicine, surgery and the allied sciences has now been brought together from all parts of the world.

Dr. Norman Moore in the course of his opening address said the museum would be a most important addition to the studies of the International Medical Congress and would deeply interest a great many of the 7,000 medical men who were expected to attend. He reviewed the formation of earlier museums, all of which are relatively recent creations and usually developments from libraries. The museum he that day formally declared open was the first established in England to illustrate the history of medicine and it might justly be regarded as a further step in the establishment of the subject as a regular study.

In responding to a vote of thanks, Mr. Wellcome expressed his indebtedness for kind services and assistance given by Sir William Osler and many other eminent men and also institutions whose names he mentioned. He regarded the museum as at its very beginning and intended the present collection to form the nucleus of a permanent Historical Medical Museum in London.

It was his intention to found in London a Bureau of Scientific Research and to appoint as Director-in-Chief Dr. Andrew Balfour, who for nearly twelve years had rendered such fruitful services as Director of the Wellcome Tropical Research Laboratories at Khartoum, Sudan.

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SEPTEMBER, 1913

THE STONE CELLS OF ACONITE ROOT.

By J. L. Stingel.

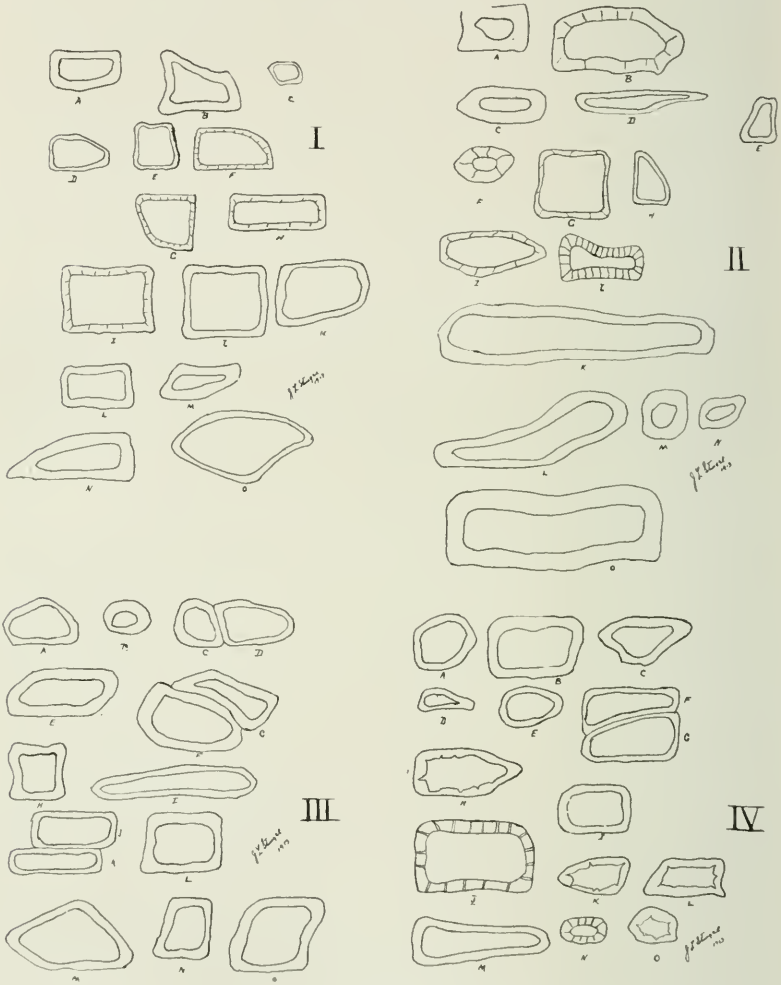
The writer no doubt owes an apology to the reader for adding to the already abundant literature on the microscopy of *Aconitum Napellus;* though the subject may appear practically exhausted, much can be learned by the restudy of a drug as it invariably reveals many interesting and frequently valuable information from the pharmacognostical view point.

Workers with a limited amount of experience are very apt to become confused if the elements do not compare favorably with those of an authentic sample or illustrations found in various text books, etc.; illustrations are helpful in a general way, but entire dependence should not be placed on them; the main trouble seems to be that many investigators are inclined to think the first few elements found are characteristic (?), whereas if a number of mounts of the same or different samples be examined it at once becomes evident that the term is very misleading; it is only after an extensive and personal acquaintance with many samples and their differences in elemental form that one becomes able to diagnose a drug with any degree of certainty.

What is said of stone cells also applies to other elements and from their condition, scarcity or abundance may often be learned whether or not the drug was gathered at the right season, and to a great extent judge its quality, etc.

Four authentic samples of powdered drug were used, the elements usually found in Aconite were present, disregarding these, all elements of a sclerotic nature were sought for, examined, measured and drawn.

Except in a few cases the different drawings represent the cells in the order of observance; they vary greatly in outline, no single form predominating; the roundish, square (?) and elongated are



Various forms of stone cells in Aconite root.

quite prominent and taken together outnumber all others. Fig. I, (f) and (g) and Fig. II, (h) shows a type occasionally met with, but which may be considered more of a curiosity than of diagnostic value; cells vary in length from 51 to 391 mikrons and from 34 to 102 mikrons in breadth, eliminating the exceedingly large ones which are only occasionally met with, the most constant dimentions would average 119 mikrons in length and 70 mikrons in breadth.

The cell wall with an aqueous-glycerin solution of chloral hydrate, freshly mounted, in many cases showed a striate or homogenous structure, while in old mounts the wall was traversed by a few or many canals; in some the fissures were very prominent, appearing as if the cell wall was composed of beads or distinct segments. Fig. III, figure (j). Thickness of wall from 8 to 25 mikrons the average being from 8 to 12 mikrons.

The outline of the lumen in most of the samples was smooth or slightly irregular, one sample showed a marked deviation from the others, being deeply ragged and angular. Fig. IV, figures (h), (k), (l) and (o).

The number of stone cells, prominence of fissures and the outline of the lumen seems to vary considerably in different samples.

From the above illustrations may be seen that the elements vary greatly in form, in fact so much so that it is practically impossible to say which are characteristic.

While the writer chose the stone cells of Aconite as a type to show the great diversity in shape and structure, he did so only as a means to introduce the subject of a more careful restudy of plant elements from the diagnostic point of view; that the beginner should not gather his information from one sample, but by the careful examination of many; let us not in text books and articles sacrifice accuracy for briefness; much rather would I see an article profusely illustrated, allowing the worker to see the variations, than one or two characteristic (?) ones.

It is only after one is thrown on his own resources and where accuracy is required that one can appreciate the situation.

LABORATORY OF BOTANY AND PHARMACOGNOSY,
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WHAT IS THE PROPER TIME FOR THE COLLECTION OF SANGUINARIA?[1]

By V. O. Homerberg, P.D., and G. M. Beringer, Jr., P.D.[2]

The U.S.P. directs that Sanguinaria be collected after the death of the foliage. In order to determine if this were the proper time, a number of samples of the rhizome were collected at various times from May—just after flowering—to August—just before the leaves began to die.

The assays of these, as given in the appended table, show that, for maximum alkaloidal content, the time directed in the U.S.P. is the worst that could possibly be selected. It will be noted that the alkaloidal content decreases from 6.5 per cent., on May 12th, to 3 per cent., on July 6th, after which it remains practically stationary. The figures for loss in weight on air drying the fresh drug show a steady decrease in moisture content as the season advances.

This would seem to indicate that the alkaloidal principles are not products essential to the nourishment of the plant, but rather in the nature of waste products of plant metabolism. Hence, these principles are not increased in amount and stored up, like the resins, gums and starches, for a period of rest. The alkaloidal percentage is, in fact, reduced by the increase of the latter classes of substances and the consequent decrease in the amount of water during the less active period of plant life.

If this is the case the rhizome and root drugs which owe their activity to alkaloidal constituents should be collected at the time of greatest plant activity—*i.e.*, about or immediately after flowering. That such is the case with Sanguinaria, the figures here given indicate. No doubt similar facts will be found to obtain in the case of the drugs of a like character. The subject is presented as one worthy of further investigation. We believe that the U.S.P. statement regarding the time of collecting Sanguinaria should be modified, because it is not the time at which the commercial drug is collected, nor is it the time of greatest alkaloidal content.

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[1] Read at the Annual Meeting of the New Jersey Pharmaceutical Association, June, 1913.

[2] The work embodied in this paper was carried out by Victor O. Homerberg and presented by him in a thesis, for his degree, before the Philadelphia College of Pharmacy. His associate has merely rewritten this portion for presentation to this Association.—G. M. B., Jr.

ASSAY OF COMMERCIAL DRUG.

Sanguinaria No. 1	3.17 per cent. total mixed alkaloids.
Sanguinaria No. 2	4.05 per cent. total mixed alkaloids.
Sanguinaria No. 3	3.12 per cent. total mixed alkaloids.

ASSAY OF COLLECTED SAMPLES OF SANGUINARIA.

Time of collection.	Per cent. total alkaloids after air-drying.	Per cent. loss on air-drying (moisture).
5/12/12	6.50	82.51
5/23/12	5.55	80.75
6/7/12	4.60	78.75
6/21/12	3.40	74.56
7/6/12	3.00	75.05
7/19/12	3.95	73.26
8/2/12	3.90	72.31
8/29/12	3.95	70.28

AN ASSAY FOR SANGUINARIA.[1]

BY VICTOR O. HOMERBERG, P.D., AND GEORGE M. BERINGER, JR., P.D.[2]

Often, the mind of human science travels in a mental maze, taking its turns by guess or luck, blindly ignoring the pointing finger on nature's sign-post. To most, if not all, of her riddles nature herself furnishes the key. The assay of Sanguinaria Canadensis, and the problems involved in the search for that assay, furnish striking proofs of these two propositions. Few alkaloidal assays present so many difficulties.

The strong colors of the salts of the principal alkaloids preclude the use of any volumetric process, as no indicator and no end reaction would be available in their presence. In the separation of the alkaloids from the drug, the soluble alkalies—Soda, Potash and Ammonia—precipitate the coloring matter along with the alkaloids, which coloring matter later forms troublesome emulsions with the solvents. Kieselguhr and Kaolin were tried for removing the coloring matter, but were found to retain considerable of the alkaloids. Finally, Lime was found to liberate the alkaloids, and, at the same time retain the coloring matter.

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Many of the volatile solvents, upon evaporation, leave the dissolved Sanguinaria alkaloids decidedly colored. This is true especially of Acetic Ether and Chloroform, traces of these solvents being apparently decomposed, thus giving enough free acids to salify a portion of the alkaloids. Chloroform is evidently the best solvent for the mixed alkaloids, but cannot be used upon this account. The next best solvent seems to be Benzol, but it takes up large quantities of coloring matter. The only two solvents free from this objection are Benzin and Ether. Benzin, however, as shown by LaWall (AMER. JOUR. PHARM., 1896, p. 305 et seq.) dissolves only a part of the alkaloids. Ether dissolves them all, but is required to be used in larger amount than Benzol because of its weaker solvent action. The final solution of this problem was the use of Ether for the first extraction, thus leaving behind practically all of the coloring matter, and the use of Benzol for the final extraction, thus giving a smaller bulk for evaporation.

The greatest trouble is met, however, in trying to extract the alkaloids from the ethereal solutions by means of acid solutions. The mineral acids, even in dilute solutions, precipitate a large part of the alkaloids. It has been this, no doubt, which has rendered most previously published assays uncertain and unreliable. Almost in despair appeal was had to nature. *She furnished the key that solved her riddle.* The alkaloids evidently existed in solution in the plant. With what natural acids were they combined? Almost thirty years ago, L. C. Hopp (AMER. JOUR. PHARM., 1875, p. 193 et seq.) demonstrated by simple but conclusive tests that those acids were Citric and Malic Acids. *Citric Acid* was the key. But, the question arose, would not the volatile solvents extract some of the Sodium Citrate formed upon neutralization of the acid solutions with Sodium Hydroxide? In order to determine this, Sodium Citrate was treated in separate portions with Ether and Benzol. Upon evaporation of the filtered solvent in a platinum basin no weighable residue was left in the case of Benzol, and only a slight residue in the case of Ether. Hence, using the two solvents in the order finally adopted in the perfected assay, the results were not vitiated by the presence of Citrates.

Many experiments and scores of unsuccessful assays were necessary to determine the facts given above. From them the following assay was evolved:

Gradually add seven cubic centimetres of water to two grams of air-slaked lime contained in a suitable dish. To the magma thus formed, add two grams of finely powdered Sanguinaria and incorporate thoroughly. Evaporate on a water bath to dryness. Transfer the dry material, after powdering, to a small percolator, the orifice of which has been closed with a pledget of paper pulp, moistened with a mixture of equal volumes of ether and benzol. Rinse the dish with a few cubic centimetres of the same ether-benzol mixture and pour the rinsings upon the material contained in the percolator. Continue the percolation by the addition of small portions of the ether-benzol mixture from time to time until a drop of the percolate, evaporated in a watch crystal and redissolved by the addition of one drop of diluted Hydrochloric Acid, no longer gives a precipitate with Mayer's Reagent. Transfer the percolate to a separatory funnel and wash with separate portions of solution of Citric Acid (5 per cent. of 25 c.c., 15 c.c. and 10 c.c. respectively. Continue the treatment with portions of 5 c.c. of the acid solution till one drop of the acid solution shows no precipitate with Mayer's Reagent.[3] Transfer the mixed acid solutions to a separatory funnel, add 15 c.c. of Benzol and afterwards sufficient Sodium Hydroxide Solution to make the mixture alkaline to Litmus. Shake the mixture thoroughly. Separate and filter the benzol layer into a tared beaker. Repeat the operation with two portions of 10 c.c. each of benzol, mixing the separated and filtered benzol solutions with that first obtained. Evaporate the mixed solutions, on a water-bath, to dryness. Cool the beaker and residue in a desiccator and weigh. The commercial drug at present assays from 3–4 per cent. total alkaloid.

For assaying the Tincture and Fluidextract take 20 c.c. and 2 c.c. respectively and evaporate the Alcohol on a water-bath; mix with the lime magma and proceed as above.

The residues given by this method are practically white and crystalline. Results are remarkably constant as compared with previous assays, the weights rarely varying more than .001 in assaying the same sample.

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[3] Total extraction of alkaloid is generally shown by absence of color in the Citric Acid Solution.

FRUITS OF RHUS GLABRA REPLACED BY FRUITS OF RHUS TYPHINA.*

By Henry Kraemer.

During the past ten years the official fruit of *Rhus glabra* has been replaced to some extent by the fruit of *Rhus typhina* or the Staghorn sumac. On several occasions recently the drug, which we have been purchasing for *Rhus glabra*, consisted entirely of the fruits of *Rhus typhina*. This replacement of one drug by another would seem to be rather common at present, yet it may be not more than was formerly the case. A careful study of even some of the official drugs on the market shows that several are entirely substituted not only by more or less closely allied species of the same genus, but even by widely separated plants. It is not the province of the pharmacognosist to determine if the substituted articles are equal to those that are official. Our task consists in the report of our findings. We may however ask the question, is it not probable that the reason for the demand, for a restricted materia medica by certain physicians, is due to the fact that some of the drugs which have been employed formerly and whose therapeutic value would seem to have been established, are in some instances replaced and substituted by other plant products, the therapeutic value of which not infrequently is unknown, and which in some cases are shown to be either very toxic or practically inert.

What is really reprehensible about this replacement of one drug by another is that it is usually done without our knowledge or consent. Then again we do not seem to consider it necessary, except in a very few cases, to study more than superficially the nature and quality of crude drugs. These matters I need not enlarge upon at this time as they have been discussed by me on several occasions before.[1] Suffice it to say that the pharmacognosist who uses the microscope in the examination of drugs and makes certain qualitative tests for characteristic constituents, often finds such a difference and alteration in the constituents in different commercial lots which only serves to emphasize again that we must give more attention to the subject of identity and quality of drugs rather than less as is advocated in certain quarters. We need only a few more instances of this replacement or substitution of drugs to call our attention to the need of directing our efforts so that the whole subject of collecting of drugs, as well as their commerce will be under some official control rendered effective by the organizations vitally interested in securing uniformity and efficiency of drugs.

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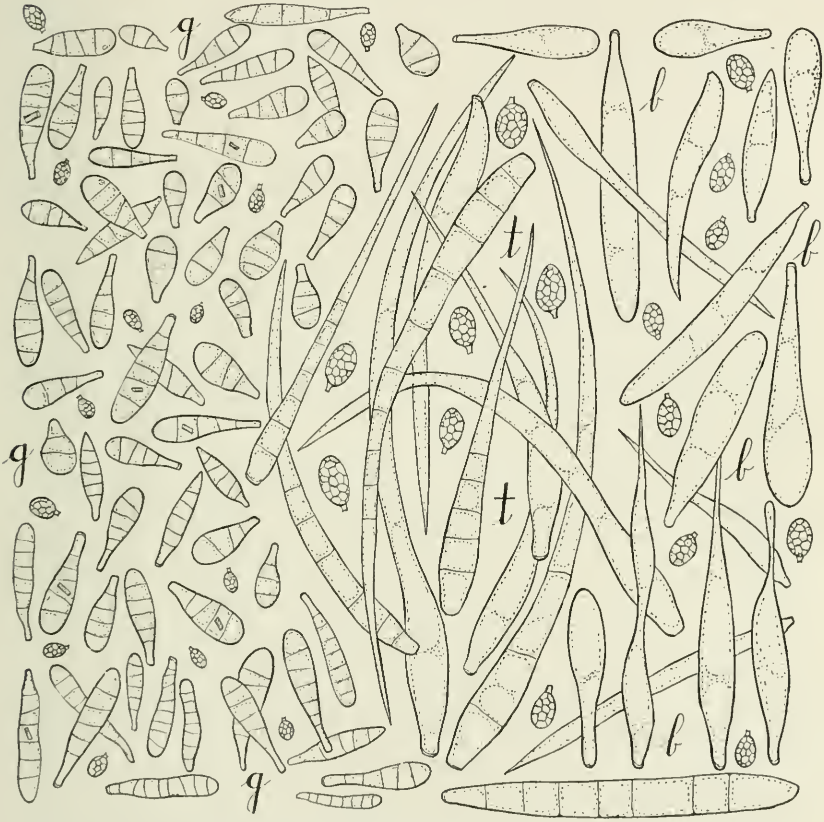
* Read at Annual Meeting of the New Jersey Pharmaceutical Association. June, 1913.

FIG. 1.



Numerous non-glandular and a few of the small glandular hairs, covering the surface of the fruits of several species of Rhus. *g*, Rhus glabra; *t*, Rhus typhina; and *b*, Rhus glabra borealis.

RHUS GLABRA.

Rhus glabra is usually known as the "smooth" or "scarlet sumac," in allusion to the nearly smooth stems and scarlet fruits. It is a rather common shrub growing in dry soil in the Eastern United States, extending as far west as Arizona and northward into Canada.

The branches and leaves contain a milky juice. The leaves are compound, the leaflets being sharply serrate, dark green above and whitish beneath, and in the fall they turn to a bright scarlet with various shades of crimson, purple and orange. The flowers are in dense terminal panicles, being staminate or pistillate, the latter developing into small drupes, which are covered with short crimson hairs giving a velvety appearance to the fruits. The latter while fully grown in August do not ripen until October. Illustrations showing the panicles of fruits of *Rhus glabra* will be found in the second edition of my Text-book of Botany and Pharmacognosy, pp. 321 and 570.

The ripe fruits collected in October are official. They are nearly globular, ovoid or more or less reniform, somewhat compressed and vary from 2.5 to 4 mm. in length and from 2 to 4 mm. in width. Externally they are dark red and velvety with short hairs. The summit is usually surmounted with a short style, and at the base there is not infrequently seen the 5-cleft calyx attached to a short stalk or peduncle. The fruit is one-locular and one-seeded, inodorous, but when fresh with an odor of green apples. The fruits have an acidulous and slightly astringent taste due to the principles in the hairs.

The hairs upon the fruits of *Rhus glabra* are of two kinds. It is chiefly in the larger and those filled with a crimson, acid sap that contain the valuable constituents of this drug. These hairs vary from more or less broadly top-shaped or carrot-shaped, to spatulate and are also sometimes more or less narrow elliptical (Fig. 1, g). They vary from 100 to 400 microns in length, and are marked by transverse or oblique partition walls forming a 3- to 9-celled hair, the broader hairs having usually not more than three cells. When viewed under the microscope the cells are seen to hold a pink colored or a dark reddish-wine colored cell sap, and in glycerin mounts it is not unusual to find one or more crystals in the shape of small rods. In among these hairs are numerous glandular hairs with short one-celled stalks and multicellular heads. These hairs are globular or broadly elliptical, vary from 45 to 75 microns in length, are of a yellowish or reddish-brown color and in chloral hydrate solution there separates one or more oily globules on the outer membrane.

The calyx of *Rhus glabra* shows a few unecllular, somewhat curved non-glandular hairs from 50 to 125 microns in length, each being very sharp pointed and with very thick walls. The small glandular hairs, if present, are relatively few.

The stems of *Rhus glabra* possess a number of glandular hairs with one- or two-celled stalks and multicellular heads. These hairs are from 10 to 20 microns in length. There are also quite a number of non-glandular hairs somewhat resembling those of the calyx but are much longer (as long as 100 microns). These latter sometimes have partition walls near the base dividing them into cells.

RHUS TYPHINA.

Rhus typhina is commonly known as the "staghorn sumac" in allusion to the soft brown pubescence covering the twigs and branches. It is also known as the "vinegar tree" and "Virginia sumac." It may attain the height of a tree, and is usually found growing in uplands in good soil, occasionally being found like *Rhus glabra* on barren gravelly banks. It is very abundant in the eastern United States and apparently sparingly distributed west of the Appalachian Mountains. It is by far more common at the present time than *Rhus glabra*, as the latter is being destroyed by reason of the construction of dwellings and also by the railroads that control much of the land in which it formerly grew.

The small branches of *Rhus typhina* are coated with long, soft hairs which are pinkish in the spring and as the stems grow older the hairs become bright green, and finally turn brown in the fall. On the stems of the second season the hairs are short and darker colored and very characteristic. The leaves and inflorescence show considerable resemblance to those of *Rhus glabra* (Fig. 2). The flowers are either staminate or pistillate and occur on separate plants. Both Wood[2] and Sargent[3] state that the flowers are occasionally polygamous. The fruit is a drupe resembling that of *Rhus glabra* in both form and size but is distinguished by being covered with long, nearly straight, needle-like crimson hairs.

It might be well at this point to consider the botanical synonym of *Rhus typhina*. In the Linnean herbarium there is preserved a specimen of the staghorn sumac in which the inflorescence is transformed into contorted bracts. This phenomena is not at all infrequent in this species and Linneaus in 1753 described this plant as *Datisca hirta*. Seven years later he described perfect specimens of the staghorn sumac as *Rhus typhina*. By reason of the law of priority the specific name *hirta* should probably be used and yet by reason of long established usage we may well adhere to the name which has been most commonly used, namely *Rhus typhina*. It was used by Asa Gray [4] and is still retained in Gray's Manual revised by Robinson and Fernald [5] in 1908. Sargent uses it in his Silva of North America [3] and it is also adopted by Engler and Prantl in their Naturlichen Pflanzenfamilien.[6] While it is true that Britton has adopted the name of *Rhus hirta* (Linné [7]) Sudworth, yet in a note in the *Bulletin of the Torrey Botanical Club* [8] he says: "Although *hirta* is the oldest specific name associated with the plant, we are I think debarred from using it by the publication of *Rhus hirta* Harv. as a synonym by Engler in DC. Monog. Phan. IV. 425 (1883), where this is referred to *Rhus tridentata*." This is confirmed in Index Kewensis and in which work *Rhus typhina* Linné also receives precedence.

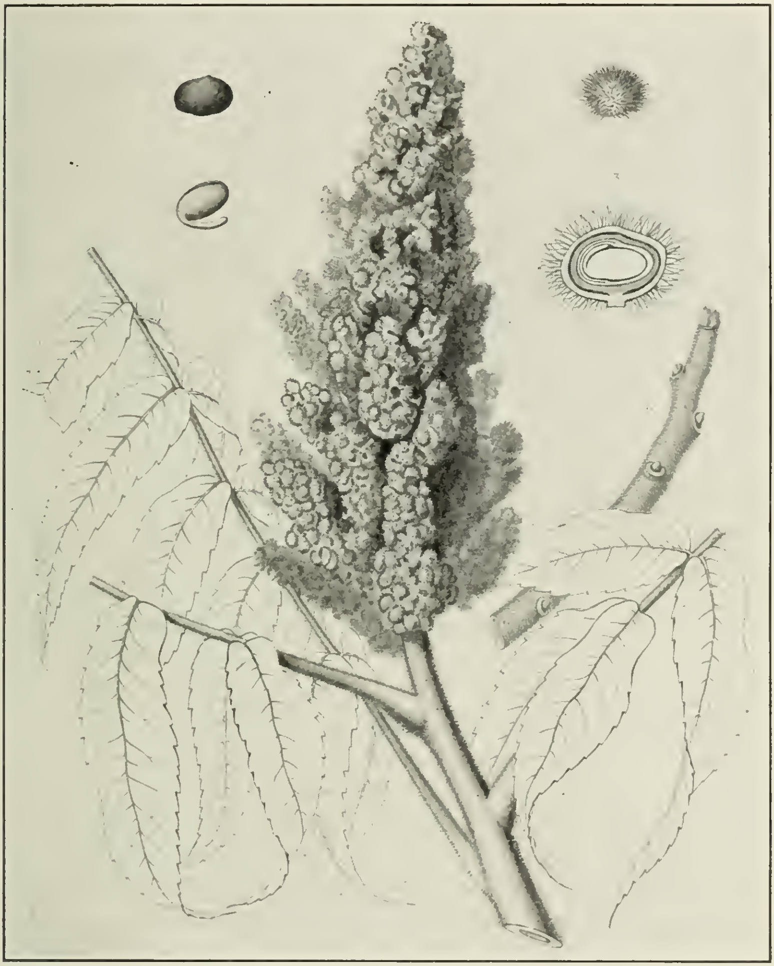
Our interest in *Rhus typhina* is that we may be able to detect the fruits of this plant in commerce. Fortunately this is very easily done as the fruits while superficially resembling those of *Rhus glabra* are darker and covered with long straight hairs giving it a characteristic spinose appearance. The hairs, however, are not indurated and are of a soft downy texture. As a matter of fact neither the panicle of fruits when attached to the plant nor the separated fruits in the drug can be mistaken for *Rhus glabra*. The hairs are long needle-like, varying from 750 to 1500 microns in length (Fig. 1, t). They are very narrow, gradually tapering and at the widest portion at the base do not exceed 50 microns in width. In the lower portion they are sometimes divided by transverse walls. The color of the cell sap and the other contents resemble those of *Rhus glabra*. Associated with these hairs are small glandular hairs varying from 75 to 120 microns in length. The upper or head-portion is more or less globular or elliptical in outline and the stalk is longer than in *Rhus glabra*.

The calyx of *Rhus typhina* is covered with hairs, these being of two types, the glandular and non-glandular. The stalks of the glandular hairs are much longer than the head portion and are usually made up of two superimposed cells. The non-glandular hairs of the calyx are similar to those found on the fruits of the staghorn sumac and may contain a similar red colored cell sap.

The hairs on the stems of *Rhus typhina* resemble those of the calyx but are much larger. The glandular hairs possess 3- to

4-celled stalks and nearly globular or elliptical, multicellular heads, the contents being of a pink or purplish-red color. The non-glandular hairs are very long, frequently over 2 mm. in length, more or less undulate in outline and have relatively thicker walls. The color of the cell sap in the non-glandular hairs varies with the age of the stems from which the sections were made, they are frequently

FIG. 2.



Fruiting branch with leaves of Rhus typhina. Reproduced from Sargent's Silva of North America.

nearly colorless, the glandular hairs only having the colored sap and these possess it in the cells comprising the upper or head portion.

RHUS GLABRA BOREALIS.

In a footnote in his " Silva of North America," Sargent [3] states: " Individual plants almost intermediate in character between *Rhus typhina* and *Rhus glabra* are occasionally found, indicating the possibility of natural hybrids between the two species." In the New York Botanical Garden Dr. Britton has labeled a number of specimens, *Rhus glabra borealis.* I have not examined these plants closely but have made a microscopical study of the hairs from several of the fruits of this material. The hairs are very characteristic and seem to be intermediate between those of *Rhus glabra* and those of *Rhus typhina* (Fig. 1, b). We find the characteristic spatulate hairs of *Rhus glabra* only they are much larger and as a whole much narrower, the upper portion tends to become obtuse and even acute rather than rounded. Again in certain specimens the hairs are very long and narrow resembling those of *Rhus typhina.* In a general way we can say the non-glandular hairs of *Rhus glabra borealis* vary from elongate-spatulate and narrow cylindrical to needle-shaped and are from 100 microns to 1 mm. in length. They are frequently cylindrical at the base and needle-shaped in the upper portion, or they may be spatulate in the upper portion and cylindrical below, and again they will have a needle-shaped base and summit and be constricted in the middle. They are more or less septate and in this also they resemble the hairs of *Rhus glabra.* These hairs also contain a pink or bright crimson cell sap which in permanency resemble *Rhus glabra* rather than *Rhus typhina.* Associated with these non-glandular hairs occur the small, glandular hairs similar to those which have been referred to under both *Rhus glabra* and *Rhus typhina.* In size these latter seem to be intermediate with those found on *Rhus typhina* and *Rhus glabra.* While these observations have no practical significance in the study of the drug, as the fruits are not found in the commercial article, they will doubtless prove of some botanical interest, as in the study of the hairs of the two species and their varieties we have a very simple means apparently of determining the extent to which hybridization may have taken place.

CHEMICAL CONSTITUENTS.

In the course of this investigation the question naturally arose as to the relative value of the several species of Rhus with hairy fruits containing a crimson, acid cell sap. A number of acids have been identified and these include malic acid, citric acid, gallic acid, and tannic acid. Some of these are free and may also be combined with calcium and possibly other inorganic bases. In order to get an idea of the relative amounts of free acid in these two species under consideration, infusions were made and these were titrated with a volumetric solution of sodium hydroxide. The method that was employed was the following: 10 Gm. of the commercial fruits, air dried, were ground in a wedgewood mortar and placed in a beaker with 100 c.c. of distilled water. The mixture was heated for from 15 to 20 minutes on a water bath and filtered through filter paper, the portion remaining on the filter being washed until the filtrate measured 200 c.c. This was then divided into two portions and titrated with a sodium hydroxide solution, each c.c. of which contained 0.004749 grams of sodium hydroxide. The infusions of these fruits yield solutions which are of a deep wine color and acid to litmus. Upon the addition of the alkali the color is first darkened, then changes to an olive-green, especially when viewed in thin layers. If at this point phenolphthalein is added and the titration carried further it will be found that nearly an equal volume of sodium hydroxide solution is necessary to neutralize it as indicated by the formation of a red color of the solution due to the phenolphthalein. It should be stated that this end reaction can only be accurately determined when the solution is viewed in thin layers. The technic in titration consists essentially in adding the alkali, drop by drop from a burette, to the original infusion of the berries until the color becomes an olive green, the phenolphthalein is then added and the titration continued until a slight reddish tint is observed. Specimens which were employed were fruits which had been gathered several years ago and it is likely that fresh fruits will show a higher per cent. of acidity.

The fruits of *Rhus glabra* have been of interest to investigators for a great many years and there are a number of papers of interest in this connection. The first chemical work on the nature of the acid sap of the fruits of *Rhus glabra* is that of I. Cozzens [8] in the *Annals of the Lyceum of New York* who reported that it contained malic and gallic acids. W. B. Rogers[9] later proved that the malic acid was in the form of a calcium salt and outlined a method for obtaining it in crystalline form. In 1853 William J. Watson[10] made some quantitative studies on the fruits of *Rhus glabra* and showed that the amount of malic acid and bi-malate of calcium varied in the fruits collected at different months in the same year. Fruits collected in the latter part of August contained 0.50 per cent. of malic acid and 7.46 per cent. of bi-malate of lime. Specimens collected late in September gave 2.75 per cent. of uncombined malic acid and 3.50 per cent. of bi-malate of lime. He also determined qualitatively the presence of gallic and tannic acids. H. K. Bowman[11] later showed that the fruits of *Rhus glabra* contained 1.90 per cent. of tannic acid. John Stenhouse[12] conducted some rather interesting experiments on the tannin in sumac and came to the conclusion that the tannic acid in sumac was related to that found in allepo and Chinese galls. Henry Trimble[13] examined all parts of the plants of both *Rhus glabra* and *Rhus typhina* at different seasons of the year and found that the berries collected in September contained less tannin than those collected in August. Prof. Trimble[14] also reported on the amount of tannin found in the galls which were occasionally formed on *Rhus glabra*. In an article on "The Chemical Study of the *Seed of Rhus glabra*," Frankforter[15] and Martin have given some very interesting results especially on the nature of the fixed oil found in the kernel of the seeds.

Name of drug	Quantity used	No. Cc. NaOH(V. S) 1 cc.=0.004749-NaOH	The percentage of acid in the fruits in terms of malic acid
Rhus glabra (old drug).......	5 grams	48.2	7.506
Rhus glabra (old drug).......	5 grams	51.8	8.067
Rhus glabra (whole fruits)....	5 grams	43.4	6.759
Rhus glabra (whole fruits)....	5 grams	41.7	6.494
Rhus typhina (whole fruits)..	5 grams	66.2	10.309
Rhus typhina (whole fruits)..	5 grams	50.2	7.818
Rhus typhina (drug).....	5 grams	72.1	11.228
Rhus typhina (drug).....	5 grams	71.4	11.119

In completing this portion of the article there are a few references to the published work on the coloring matter of *Rhus glabra* that might be mentioned. The first article in which mention is made of the nature of this principle is that of Watson[10] already referred to. He considers that the true color is blue and that it is changed to red by the action of the free malic acid present. As a matter of fact this is true practically of all plant color substances as I [16] have shown in an article on "The Origin and Nature of Color in Plants." An interesting observation is that of Palen [17] who reported that the coloring principle in the leaves of *Rhus glabra* seemed to resemble that in quercitron bark, meaning thereby probably the bark of the black oak (*Quercus velutina*, Lam.). Perkin and Allen [18] isolated the coloring matter in Sicilian sumac (*Rhus coriariæ*) and found it to be identical with myricetin, the coloring matter of *Myrica nagi*, and are of the opinion that the different species of *Rhus* do not contain either quercetin or quercitrin. It will thus be seen that there are many interesting phases of study of the several species of *Rhus*, the fruits of which are clothed with acid crimson hairs. Some additional comparative work in which the fruits of *Rhus copallina* L. were used, will be reported upon later.

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[11] Henry K. Bowman, *Amer. Jour. Pharm.*, 41, 1869, p. 195.

[12] John Stenhouse, *Amer. Jour. Pharm.*, 34, 1862, p. 253.

[13] Henry Trimble, *Amer. Jour. Pharm.*, 72, 1900, p. 337; *Ibid.* 75, 1903, p. 344.

[14] Henry Trimble, *Amer. Jour. Pharm.*, 62, 1890, p. 564.

[15] G. B. Frankforter and A. W. Martin, *Amer. Jour Pharm.*, 76, 1904, pp. 151–158.

[16] Henry Kraemer, *Proc. Amer. Philosoph. Soc.*, xliii, 1904, No. 177, pp. 257–277.

[17] Joseph A. Palen, *Amer. Jour. Pharm.*, 60, 1888, p. 389.

[18] Perkin and Allen, *Proc. Chem. Society*, 1896, p. 157 abstracted in *Amer. Jour. Pharm.*, 68, 1896, p. 687.

A SIMPLE AND CONVENIENT DEVICE FOR HANDLING HOT EVAPORATING DISHES.[1]

By Charles H. LaWall.

The lifting, holding or transferring a hot evaporating dish is frequently very inconvenient. The crucible tongs, although sometimes used, are not well adapted for the purpose of handling any but the smaller dishes. For handling dishes varying from six inches in diameter upward they are very risky to use.

Test tube holders are even less well adapted than crucible tongs and the method which is frequently, or, one might say, generally employed, that of using a towel or a piece of cloth, is decidedly unsatisfactory and unprofessional.

A satisfactory device which may be made in a few minutes by anybody who has a large cork and a sharp penknife has been in use by me for a long time with great success.

Take a No. 10 or 12 cork and, beginning at the small end, cut a slit in it slightly wider than the thickness of the dish and running back about three-fourths the length of the cork. When completed this makes a springy handle which can be slipped over the side of the dish and firmly grasped with the fingers without danger either of burning them or contaminating the contents of the dish. For large or heavy dishes, two of the improvised handles may be used, one being slipped over each side of the dish when it is to be moved.

THE NATIONAL FORMULARY AND PROPRIETARY REMEDIES.[1]

By M. I. Wilbert, Washington, D. C.

It has been repeatedly asserted that the National Formulary is designed to be of value primarily to those who would make preparations in imitation of popular proprietary remedies and individuals who are more or less directly interested in the exploitation and sale of nostrums have dilated on the wrongfulness of this practice to such an extent that many otherwise well informed physicians and even pharmacists are actually convinced that there is an element of truth in the assertion that the National Formulary is at best but a compilation of formulas for poor imitations of widely used, original and medicinally valuable remedies.

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[1] Read at the annual meeting of the Pennsylvania Pharmaceutical Association, June, 1913.

This accusation, while it sounds formidable, will not bear careful analysis, for the preparations represented in the National Formulary can readily be shown to be: 1. Not imitations in any sense of the word because the preparations of which the N. F. preparations are said to be imitations are themselves not original and have nothing to be imitated except the method of their exploitation. 2. Not indispensable or even medicinally valuable despite the fact that some of them are widely used.

That the National Formulary does not and of necessity cannot include formulas for preparations that are indispensable or even particularly valuable must be conceded when we call to mind the fact that the Pharmacopœia of the United States has for nearly a century included formulas and standards for all of the really valuable remedies known to American medicine. The completeness with which this is done is reflected by the frequently made assertion that the Pharmacopœia contains an over abundance of material and at the present time includes many articles that are neither valuable nor indispensable, while the number of really useful galenicals that are not recognized by the U. S. P. is indeed small; granting that there are any.

The National Formulary is not and never was intended to be other than a repository of formulas for preparations, good, bad or indifferent that have been recognized in current literature or are being experimented with by physicians and for which there is need for establishing a uniform standard of strength so as to avoid variable and possibly untoward results from the use of preparations differing in composition or strength at the will of the maker.

The primary and the only valid object then, in including the formula for a preparation in the National Formulary, is to give that preparation the benefit of any doubt as to its possible usefulness and by securing uniformity in composition and strength for a reasonable period of time, allowing medical practitioners to determine impartially by experience and observation the utility or the uselessness of the combination for the purposes for which it was thought to be useful.

This brings up again the question of originality and the accompanying question of property right in an invention or a discovery.

Broadly speaking, there is no such thing as originality and all invention or discovery is at best but a new application of established knowledge or a combination of established principles in a way not apparent to or recognized by the general public.

This thought, conception or discovery is and must of necessity remain the property of the originator so long as he cares to keep it to himself but becomes public property so soon as the originator communicates it, either by word of mouth suggestion or otherwise to others.

To foster the development of human knowledge and to promote progress in science and the useful arts civilized governments have instituted patent laws ostensibly designed to establish the property rights of an individual in an invention but in reality used to serve as an incentive to others to improve and to enlarge upon the progress recorded. The courts, in this country at least, have elaborated on this principle and have ruled that under established laws an inventor or discoverer has a right to the exclusive enjoyment of his invention or discovery and that his right is secured to him for a limited but definite period of time by our patent laws and for an indefinite period of time by strict secrecy.

Thus it has been decreed (Tabor *v.* Hoffman, 118 N. Y., 30–8) that "independent of copyright or letters patent an inventor or author has by the common law an exclusive property in his invention or composition, until by publication it becomes the property of the general public." Publication has in turn been defined as the freely giving or the selling of a composition or an article to another which other person may impart his knowledge of the article to others or further elaborate on the discovery or invention and thereby secure for himself such property right in the elaborated invention as may be available under the provision of existing laws.

Thus in the same case quoted above (Tabor *v.* Hoffman, 118 N. Y., 30–8) the New York Court said: "If a valuable medicine is not protected by patent, is put upon the market, anyone may, if he can by a chemical analysis and a series of experiments, or by any other use of the medicine itself aided by his own resources only, discover the ingredients and their proportions. If he thus finds out the secret of the proprietor he may use it to any extent that he desires without danger of interference by the courts."

As suggested elsewhere patents, under our existing patent laws, are but a reflection of the development of general knowledge along any particular line and demonstrate our lack of knowledge by establishing the degree of originality that is thought to be sufficient to secure a patent.

Under the patent laws now in force in this country it has not been possible for nearly a century to obtain a patent on a formula for a mixture of substances for use as medicine or to secure a property right in any such formula by any other means than absolute secrecy, as suggested above.

There being no legal basis for property right in a formula or medicinal preparation consisting of a simple mixture of well-known substances, it may be held that the maker or the originator of such a mixture might have a moral right to the exclusive use of such a formula or mixture, even after giving to it the degree of publicity involved in the sale of the medicine for profit. Here, however, the larger and broader rights of the people as a whole must be considered and the problem again resolves itself into a matter of publication, exploitation, or sale. Under our common law practice the public has a right to assume that all matters of general knowledge are public property to be used or restricted as the majority of the people think best. The public also has a right to assume, and the experience has demonstrated the correctness of the assumption, that there is no available method by means of which the output of a secret formula can be controlled so that from the point of view of public policy the use of proprietary secret or semi-secret medicinal preparations should be discouraged. It has well been stated that in matters of medicine the public should above all disregard personal and financial considerations since the question resolves itself into a need for accomplishing the greatest and most permanent good for suffering humanity. The public health and the protection of the general welfare of the public are first to be thought of, and any thing that stands in the way of promoting this general welfare must be considered as being negligible or even objectionable.

To sum up the problem it would appear that, from any available point of view, the cry of imitation that has been raised against National Formulary formulas is unwarranted. The National Formulary is to all intents and purposes a public work compiled and used to promote the best interests of the public and to safeguard the public health.

While it is true that originally the National Formulary was compiled by an association of pharmacists to bring a degree of relief to the followers of their craft who were being oppressed by commercial conditions that were evolved largely through falsehood and misrepresentation, it is also true that the book has developed to be and must continue to be a factor in the elimination of ignorance and hypocrisy from the practice of medicine.

Just a little sober thought devoted to the subject will convince even the skeptical that while the National Formulary has done much to promote the evolution of American Pharmacy along professional lines its direct and indirect influence in the way of establishing the therapeutic uses and limitations of drugs and preparations of drugs on a firm scientific basis will prove, in time, to have been its greatest achievement.

THE PROPOSED METHOD OF MICROSUBLIMATION FOR THE DETECTION OF ÆSCULIN AND THE IDENTIFICATION OF GELSEMIUM.[1]

By Frank Tutin.

In some recent "contributions to applied plant microchemistry," O. Tunmann has proposed a method for the detection of æsculin by the microsublimation, which he considers especially adapted for the identification of gelsemium.[2] It is stated that when a small quantity of the ground drug, or a section of the rhizome or root, is placed between two microscope slides, and suitably heated, a characteristic crystalline sublimate of æsculin is obtained. The sublimate is recognized with the aid of the microscope by its appearance, crystalline form, and certain reactions. It is furthermore stated that æsculin, when examined by the micro-chemical method, does not behave as it does under the conditions of an ordinary chemical experiment. Thus, in chemical literature, æsculin is stated to lose its water of crystallization at about 130°, to melt at 160°, and to decompose, yielding æsculetin and dextrose, at about 230°. Tunmann states, however, that when examined by the microsublimation method, æsculin melts at 49–50°, sublimes readily at 58–60°, and may even be sublimed out of gelsemium at so low a temperature as 40°, no decomposition occurring. The author finally claims that the method is of such value that it should be adopted by the Pharmacopœias as a test for the identity of gelsemium.

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[1] A communication from the Wellcome Chemical Research Laboratories, London, E.C., and reprinted from *The Pharmaceutical Journad and Pharmacist,* February 10, 1912.

[2] *Apoh. Zeit.,* 1911, 26, and *Pharm. Journal and Pharmacist,* 1911, 87, 849.

In view of certain facts, however, it appeared to the present author that the subject required further investigation. In the first place, the suggestion that the chemical and physical properties of a compound can be greatly altered by the conditions under which it is examined cannot be entertained. A small amount of a compound will melt at the same temperature when heated between two microscope slides as when heated in a capillary tube in the ordinary manner, and it will not become more volatile by being examined under a microscope. In the second place, gelsemium does not contain any æsculin, and therefore Tunmann cannot have obtained a sublimate of this compound from the drug in question.

The fluorescent principle in gelsemium has been shown to be scopoletin (æsculetin 5-methyl ether), and not æsculin.[3] Sonnenschein,[4] whose work is referred to by Tunmann, stated that he isolated æsculin from gelsemium, but a consideration of the method employed by him renders it evident that the compound he obtained could not have been the glucoside in question, and must have consisted of scopoletin. Thus Sonnenschein states that the drug was extracted with a mixture of equal parts of alcohol and water, the extract concentrated, and deprived of resin. The liquid was then treated with basic lead acetate, the precipitate collected, suspended in water, and decomposed by means of hydrogen sulphide, the crystalline compound being obtained by extracting the resulting liquid with ether. He also states that a further amount of "æsculin" was obtained from the filtrate from the basic lead acetate precipitate by extraction with ether, after the removal of the lead by means of hydrogen sulphide. Not a trace of æsculin, however, can be removed from its aqueous solution by extraction with ether, whilst scopoletin, on the other hand, may readily be removed by this means. Furthermore, it is stated by Sonnenschein that the "æsculin" obtained by him from gelsemium is identical with the "gelseminic acid" of Wormley,[5] but the latter compound has been shown by Schmidt [6] to be scopoletin.

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[3] Moore, *Journ. Chem. Soc.*, 1910, 97, 2223; 1911, 99, 1043.

[4] *Ber.*, 1876, 9, 1182.

Unfortunately, the statement that æsculin is present in gelsemium now occurs in several standard works, such as Beilstein's "Handbuch," but these statements are in every case attributable to the incorrect observation of Sonnenschein.

With consideration of the above facts it was deemed desirable to ascertain the behavior of anhydrous æsculin, æsculetin, scopoletin, and finely ground gelsemium on heating. Small quantities of the materials in question were placed in small, thin glass tubes, the open end sealed, and the substances then simultaneously heated in a metal bath, the temperature of which was recorded by a thermometer placed in the liquid. At 140° the scopoletin just commenced to sublime, and at 150° a distinctly crystalline sublimate was obtained from it. The temperature was then raised to 170°, at which point it was kept for several hours. The scopoletin then sublimed fairly rapidly, yielding almost colorless, well-formed crystals. The gelsemium also yielded a small sublimate, which was, for the most part, composed of crystals of scopoletin. The æsculin gradually melted, and darkened somewhat, slowly yielding a slight sublimate of tarry matter, containing no crystals, whilst the æsculetin remained unchanged. The temperature was then raised to 210°, and again maintained constant for several hours, when the scopoletin fused, and sublimed rapidly. A further sublimate was obtained from the gelsemium, but was largely of a tarry nature, whilst the æsculetin slowly sublimed in pale yellow crystals. The æsculin suffered gradual decomposition, giving a further sublimate of tarry matter, together with crystals of æsculetin, the identity of which was proved by the melting point (264°).

It is thus evident that the sublimate obtained by Tunmann from gelsemium must have consisted of scopoletin, and not of æsculin, as supposed by him, and that the temperature to which he heated the drug must have been at least 100° higher than he has stated.

In connection with these experiments the melting-point of æsculin has been redetermined. It has been found that the glucoside in question does not melt at so low a temperature as 160°, unless it has become partially decomposed by very slow or prolonged heating. When heated fairly rapidly, in the ordinary manner, fusion occurs at 200–202°.

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[5] *Amer. Journ. Pharm.*, 1870, 42, 1.

[6] *Arch. Pharm.*, 1898, 236, 236.

The observations recorded in this note readily explain why it was that Tunmann failed to obtain any satisfactory sublimate from the bark of *Æsculus hippocastanum,* which is known to contain a fairly abundant amount of æsculin, but which, so far as known, is devoid of scopoletin.

The detection of scopoletin in gelsemium may, however, prove to be a valuable means of distinguishing this drug from others of a similar appearance, such as that derived from *Gelsemium elegans,* Benth., but it is doubtful whether the sublimation method is the most convenient one. If 0.5 gramme of ground gelsemium be heated in a test tube with chloroform, the mixture filtered, and the filtrate shaken with water to which a few drops of dilute ammonia have been added, the aqueous layer, on separation, will be found to show a distinct, blue fluorescence, thus indicating the presence of scopoletin.

A COUNSEL OF PERFECTION: A PLAN FOR AN AUTOMATIC COLLECTION AND DISTRIBUTION OF A STATE TAX FOR HIGHER EDUCATION.[1]

By J. G. Rosengarten.

The example of the western state universities suggests a similar organization for other states. Here in Pennsylvania the University, dating from 1740, when under the inspiration of Whitefield, the plan of a school was first mooted, has outgrown its modest endowments. Biennially it goes to the legislature to ask help to carry on its work. In the interval it appeals to its alumni and friends for help to meet its pressing needs, higher salaries, a larger teaching force, and more buildings and appliances for its multifarious educational needs.

What is true of the University of Pennsylvania is true of all other universities and colleges of Pennsylvania, and of the East and South, and no matter how large their endowments and income, each and all require more money to keep pace with the growing expenses of higher education in the modern university.

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[1] Read at the Annual Meeting of the American Philosophical Society, April 17, 1913, and reprinted from the Proceedings of the Society, **52,** 1913, pp. 243–256.

It needs no apology to broach the matter here, for Franklin founded both the American Philosophical Society and the University of Pennsylvania. In fact after the Revolution the charter of his College of Philadelphia was taken away, and a Charter given to the University of the State of Pennsylvania, and the constitution affirmed the duty of the state to help it. Later the charter of the college was restored, and still later the college and the university were united in the University of Pennsylvania, and it has grown to its present great estate under that charter and that name.

From time to time the state has aided it, and private munificence has enabled it to provide the splendid buildings in which it is now housed, with College and Law and Medical Departments, and to maintain in Towne Engineering School, and the Wharton School of Finance and Economy, and the Zoölogical and Dental and Veterinary Schools, and a long list of endowed Professorships and Fellowships and Scholarships and prizes. With all these, and the other resources of the university, there is still an annual deficit which must be met. To do so would require an additional endowment sufficient to provide an income of half a million dollars to meet the needs of the university. How to provide this is a question that taxes the university authorities and exacts time, thought and anxiety of provost, trustees, faculty and alumni, when they ought to be free to give attention to the work of instruction and to raising the standard of education in all its departments.

Illinois, Indiana, Iowa, Montana, Wisconsin, are among the western states which have state universities. In their state constitutions provision is made for an automatic assignment of a small part of the state taxes for their support. Thus all appeal to the state legislature for support is made unnecessary. In Wisconsin, and in many other universities, colleges, etc., the United States Land Grant is made part of the endowment of the state university, and for agricultural and technical schools. Iowa has recently put all its educational institutions under a single governing board. All the western universities have out of the increasing wealth and revenues of their states provided incomes growing in proportion to their needs, and their activities keep pace with them. University extension lectures carry their teachers to every part of their state, and every branch of education is fostered under intelligent guidance, with university men spreading the influence for higher and better education.

A constitutional convention is soon to be called in Pennsylvania. There a plan should be formulated, submitted and discussed for a reorganization that may strengthen institutions of higher education in Pennsylvania. The plan and method of securing automatically a portion of the state revenue for the purpose of education are now in force in twenty-one states, so that there is little novelty in the idea, for it has been in practical operation in all of them, with various differences, and yet almost uniformly successful results. Only recently, in acknowledging a paper on German Universities, that Nestor of both American and German universities, the Hon. Andrew D. White, of Cornell, wrote:

> "It is doing a duty to the country to call attention to the evils caused by the scattering of resources among so large a number of institutions bearing the name of 'University.'
>
> "The worst affliction of our whole existing system is the fact that such a multitude of institutions which ought to be called 'Colleges' are pretending to do University work, while they are in no condition to do the duties worthy of that name.
>
> "What the country needs is a concentration upon a smaller number of Universities, with a large number,—no matter how large indeed,—discharging a function akin to that of the 'Gymnasia' in Germany, which might very honorably be called 'Colleges.' An example of a better practice may be found in some parts of New England, where institutions, some of which were up to a recent time called 'Universities,' have become frankly 'Colleges.'
>
> "We are about to have Universities which will give us high rank throughout the World, and among them especially the State Universities of the West, as well as some that have been established upon large foundations in the eastern part of our country.
>
> "As to the Western State Universities, their progress is simply amazing. There has been developed an honorable pride in them by their respective states, and this has been deepened by a very honorable rivalry between sundry commonwealths, as for example Michigan, Wisconsin, and Minnesota, which has resulted in a magnificent fruitage.
>
> "While the standard of scholarship is kept deplorably low in some of the smaller Universities, it has been steadily rising in many of the better endowed institutions. The increase of lectures by distinguished foreign professors at various American Universities of the better sort, will be productive of great good. Cornell, for example, is about to have an extended course of lectures on American History, by a renowned Oxford Professor upon

the Goldwin Smith Foundation. Who would not gladly exchange our scattered flock of Universities and Colleges, running up into the hundreds, for the twenty-two Universities of Germany?"

There too the important cities of Hamburg and Frankfurt are about to coördinate all their existing institutions of science, art and literature, into great metropolitan universities, retaining all the useful elements of successful and thorough education and training, and elevating the standard of work.

Against the twenty-four universities, and nine technical schools, of Germany, the last report of the Commissioner of Education of the United States reported nearly five hundred universities and colleges for men, and one hundred and thirty for women, and over one hundred and fifty technical schools, nearly one hundred law schools, and proportionately numerous medical, dental, pharmaceutical, and other allied special schools. With this enormous disparity in numbers, it is easy to see why the German schools and universities do their work thoroughly and well.

The state regulations and examinations for the bar and for medicine and various other professions and employments, show the need felt for something more than the diploma of university, college or technical school.

A state university, representing, in its government, all the institutions of instruction in education, in all its varieties, general and technical, would give strength to each and all of the schools affiliated with it, and its degrees, awarded on their recommendation, would be greatly enhanced in value.

The first step in Pennsylvania would be to take advantage of the proposed constitutional convention, and introduce into the new state constitution,

First.—Provisions for an automatic appropriation of part of the revenue of the state, to higher education, to be distributed in the maintenance of a University of the State of Pennsylvania, and allied colleges and technical schools, thus going back to the wise provision of the Constitution of 1779.

Second.—Legislative power to strengthen and increase the power of the College and University Council, with the Governor, the Superintendent of Public Instruction, the Attorney General, State Officers, ex-officio, and the presidents of the University of Pennsylvania, Pittsburgh, Lehigh, Bucknell, and of Washington, Jefferson, State, Franklin & Marshall and other colleges and other institutions, the members.

Third.—To give that board power to distribute the state educational fund among the state universities, colleges, technical schools and other institutions of learning, science and art, on such terms as to numbers of teachers and students, standards, and other conditions as may be prescribed by the college and university council.

Fourth.—To make all universities, colleges, technical schools and institutions for higher education, branches of the university of the state, retaining their names, organization, endowments, etc., but requiring annual returns of all the details of numbers, income, work, etc., on a uniform basis, with provision for inspection, audit, examination, so thorough that the highest standard of efficiency may be secured and maintained, under the penalty of losing any claim to the income from the state education fund; the council to have the right and privilege of approving and recommending the degrees in course conferred by the university and other universities and colleges of the state, with power to revoke or modify charters of any affiliated institution for cause.

Fifth.—The college and university council to have power to consolidate existing institutions working in one district or multiplying the work that could be better done by one strong institution, thus giving to the state one or more medical, legal, technical or other schools, in lieu of an unnecessarily large number of small schools, weakened by competition, lessening standards, and not really serving the state, owing to insufficient means and inefficient methods.

Sixth.—Uniting with the state university, libraries, university extension work, scientific and art and technical schools and museums, in such a way that all unnecessary duplication may be prevented, and higher education ensured through uniform grants form the state educational fund.

Seventh.—The college and university council to have the inspection of the normal schools, in such a way as to unite in close sequence the methods of education, from the public and private schools, the normal schools, etc., through the colleges and technical schools and up to the university.

Twenty states have made provision in their constitutions for automatic collection and distribution of a small part of the revenue of the State to aid in the work of education of its people, and Pennsylvania should make similar provision in its new constitution. It would increase the efficiency of its institutions of learning, relieve the legislature of a task which is no part of its proper duty, free the trustees and officers and faculties of our universities and colleges from the necessity of going to the legislature and the governor of the commonwealth, give them a right to a part of the state revenue thus set apart for education, elevate the standards and enhance their efficiency, by allying them with the University of the State of Pennsylvania, and give their degrees a position recognized through the state and beyond it.

This may be a counsel of perfection, but none the less well worth discussion and careful consideration by the American Philosophical Society, true to its purpose of promoting useful knowledge. What can be more useful than to know how best to bring to bear on education the means and methods of securing that which is best fitted to prepare men and women to be good citizens, to teach them all that is necessary, to secure them the best schools for every profession and occupation, and to reform existing institutions of learning, so that they may do the greatest good to the largest number?

Make the state supply from its plethoric treasury, the money required for higher education, as it does for secondary and elementary schools, and then the distribution may be safely put into the hands of the state's college and university council, composed of state officers and the representatives of the universities and colleges and technical schools. Among them will be found men who will see that the state's money is well spent, with a proper distribution between buildings and maintenance, salaries and expenses incidental to instruction.

The state will supply through its *ex-officio* members and its trained inspectors due protection against undue expenditure of any kind.

The state college and university council may properly insist that wherever money is given for any special purpose, it shall be enough to provide for future maintenance, and not be, as it too often is the case to-day, a burden on income. There are plenty of reforms incidental to a reorganization of our institutions of learning, that will need the careful consideration of the state college and university council. A few years will serve to show how unnecessary duplication of work can be prevented, how neighboring colleges can be united into one strong college, how technical and professional schools can be strengthened by reducing their number, and increasing their efficiency, how an exchange of professors may be systematized to the advantage of teachers and students, and how the standard of education may be raised.

Much will be done by the teachers themselves, and there can be no better inspiration to improve methods than to draw from the great body of men trained in the work of education, the results of their experience. Of course there will be impracticable suggestions and unworkable plans proposed, but those will all be submitted to the trained and experienced members of the State college and university council, and after full discussion, their judgment will choose the good and reject the bad. Plans and methods of teaching will be entrusted to experienced teachers, and the profession will rise in dignity and importance, as the work shows the good results of their experience, knowledge and ability. All this and much else can be accomplished if the new constitution of Pennsylvania makes the business of education a matter of state support and state government.

Andrew D. White, that Nestor of Higher Education in this country, first president of Cornell University, and always its inspiration, read a paper on "Advanced Education," before the National Education Association at Detroit, in 1874. Urgent arguments are brought forward for a reorganization of American universities and colleges and technical schools as part of the work of the state. Dr. White urges the necessity of careful public provision by the people for their own system of advanced instruction as the only republican and democratic method. Public provision, he said, is alone worthy of our dignity as citizens. It will stimulate private gifts and free them from the dogmas of living donors and dead testators. The nucleus of Cornell University was the national land grant, which has been supplemented by an increasing flow of private gifts to the endowment.

The state of Michigan made the national land grant the foundation of its great university, and has added to it from time to time with the best results. It has thus strengthened the whole system of public education throughout the state. The national grant and the state grant together have thus been united to make a great university, and provide the endowment of advanced instruction, and to coördinate education from the primary school to the highest technical and scientific and classical and collegiate and professional training.

Such an example and that of twenty other States all point to the best way of meeting the general demand for a more regular and thorough public provision for advanced education, not through appeals to legislatures, to be subject to all the risks of overtaxed public bodies, but by a constitutional provision for a fixed, though small, percentage of the income of the State to be set apart for higher education and for all branches of education that ought to be maintained at the public expense, to be expended through the college and university council, made up of state officials and representatives of universities and colleges and institutions of advanced scientific and technical education. Established by law in 1895, it only needs increased power to do its best work.

Well directed public bounty, as President White says, stimulates private bounty. Generous men and women, seeing that the current needs of such institutions were provided by state revenue, would gladly give freely and largely for such special additions as may appeal to them. The alumni of universities will find new inspiration for their activity in giving, advising, and encouraging the growth and prosperity and advancement of their alma mater. Thus, nation, state, alumni and individual grants and gifts would be united to strengthen state institutions and enable them to give the highest literary, scientific and industrial instruction.

The same trend of educated opinion is found in other publications of the highest authority. In the 44th annual report of the Smithsonian Institute, that for 1889, Professor Herbert B. Adams's paper on the state and higher education gives the strongest facts and arguments in support of state aid. He points out that in colonial days Maryland began her educational history by paying a tobacco tax for the support of William and Mary College in Virginia. Vermont appropriated a township of land for Dartmouth College in New Hampshire. New Haven sent corn to the support of Harvard. In later times Michigan gave to the university one-twentieth of a mill tax on every dollar of taxable property; Wisconsin one-eighth of a mill; Nebraska three-eighths of a mill; California one-tenth of a mill; and now the same rule holds in so many states that it may be described as the normal basis for state aid to higher education.

In the proceedings of the National Education Association there are abundant evidences that the leading and recognized authorities on education in this country take the same view.

In the report for 1900, President Swain, then of Indiana University, now of Swarthmore, gave a sketch of the history of the promotion of higher education by the state from early times until the present. He gives forty-five as the number of colleges and universities supported by the state, and points to seven representative state universities—California, Illinois, Kansas, Michigan, Minnesota, Nebraska, Wisconsin.

President Beardshear of Iowa State College of Agriculture, said there were 64 colleges or departments inaugurated by the Act of Congress of 1862, making land grants for the establishment of schools for mechanical and agricultural instruction.

Again at the National Education Association meeting of July, 1901, President Jesse of the State University of Wisconsin, read a paper on the "Function of the State University." He points out the opportunities for collaboration with state boards, bureaus and commissions, with a view to serious study of social and economic conditions.

To-day and in and by our own university much is done for the state and the city, but as a matter of grace; make it the university of the state, and state and city would ask for help as a matter of right. Social and economical and legal problems would be attacked and solved. By coöperation with boards of education and state and local superintendents, the university would help to build up schools, from primary to normal, by trained inspectors, skilled examiners, lecturers, practical teachers. Colleges and higher technical schools should be brought into union with the university, all working towards the common end and aim, the best education of the largest number.

The university of the state should be in close touch with all the state boards, bureaus and commissions, the geological survey, the bureaus of health, education, forestry, mines, industries, all the innumerable functions and activities of the state. The university should help in the preparation of laws governing taxation, every day growing more complex, and in every form of economic instruction, for the benefit of the state in its legislation, and of the plain people. In Pennsylvania, mining, metallurgy, manufacturing, forestry, light, heat and power, are among the living issues that require sound legislation and to prepare it should be one of the functions of the university of the state.

The United States Bureau of Education publishes annually a Bulletin of Statistics of State Universities. These include a directory of state universities and other state-aided institutions of higher education, noting specially those endowed by the federal government under the Morrill Land Grant Acts. These numbered 87, besides 16 agricultural and mechanical colleges for colored students, in the list for the year ended June 30, 1912. There are tables showing the teaching force, the student enrollment, the property and income of the 87 state universities and state-aided institutions.

State universities and state-aided institutions of higher education included in this list, corrected by figures of Professor Maphis' Report, are as follows:

		Income from Mill Tax.
Arizona	3/5 of a mill	32,000
California	22.5/100 of a mill	750,000
Colorado	3/5 of a mill	223,000
Illinois	3 mills	
Indiana	1/10 of a mill	173,000
Iowa	1/8 of a mill	
Kentucky	1/2 of a mill	47,000
Michigan	3/8 of a mill 1/10 of a mill	650,000 173,000
Minnesota	23/100 of a mill	260,000
Nebraska	1 mill tax rate	411,000
Nevada	1/2 mill tax rate	
New Mexico	65/100 mill tax rate	
North Dakota	1/5 mill tax rate 33/100 mill tax rate	
Ohio	17/2000 mill tax rate 107/2000 mill tax rate 540.000 17/2000 mill tax rate	92,000 366,000 88,000
Texas	1-3/4 p. c. gross revenue of state	
Utah	7.94 p. c. of 4-1/2 mills on the dollar	
Utah	18.04 p. c. of 4-1/2 mills on the dollar	
Wisconsin	3/8 mill tax rate	664,000
Wyoming	1/2 mill tax rate	24,000

President James of Illinois State University, says the Legislature of Illinois at its last session (1912) passed a law providing that a tax of one mill for every dollar of assessed valuation should be levied for the support of the university. This will give about two and a quarter million dollars per year, available July 1, 1913. Owing to the provision in the constitution of Illinois that the legislature may not make appropriations for longer than two years, the legislature must appropriate at each session the money represented by this mill tax and labeled for the support of the University of Illinois.

Michigan and Wisconsin provide for the levying of a certain so-called mill tax, three-eighths or four-fifths of a mill, the proceeds of which are turned over to the board of trustees of the beneficiary institution.

The statistics of state universities and other institutions of higher education partially supported by the state for the year ended June 30, 1912 (*Bulletin*, 1912, No. 33), give a great many details, among them a table of property and income of state universities and other state-aided institutions, showing that there were paid—

	By the State.	By the United States.
To the University of California	1,124,506	80,000
To the University of Indiana	1,918,900	79,938
To the University of Minnesota	2,314,713	80,000
To the University of Missouri	610,093	76,875
To the University of Nebraska	651,318	80,000
To the University of Cornell	478,000	72,000
Ohio { Miami University Ohio University Ohio State University }	1,131,778	50,000
To the University of Wisconsin	1,552,398	80,000

The same table gives the receipts from the mill tax and other sources of some of the states, as follows:

Colorado (4 institutions)	406,053
Indiana (2 institutions)	259,504
Iowa (3 institutions)	407,200
Michigan (2 institutions)	932,867
Minnesota	689,521
Nebraska	374,163
Ohio (2 institutions)	480,828
South Carolina	114,113
Utah	150,000
Wisconsin	1,103,029
Wyoming	84,000

The same table gives among the many private benefactions to those state-aided universities:

California	566,000
Nevada	150,000
Cornell	1,307,111

The records of these 87 state-aided institutions confirm the belief that private benefactions will continue to supplement in generous measure the state-aided institutions just as these show by their results that they are entitled to individual as well as state help.

Pennsylvania expended in 1912 for—

Department expenses	$4,972,538.34
Expense of government	5,390,798.00
Commissions	407,900.00
State institutions	3,342,348.33
Penitentiaries and reformatories	544,378.69
Semi-state institutions	685,750.00
Educational	8,737,600.00
Hospitals	2,683,650.00
Homes and other charitable institutions	368,300.00
Miscellaneous	1,059,500.00
	$28,192,763.36

If the appropriations for education were made by the college and university council and those for forestry, mining, etc., by boards or commissions on which were the best experts from the universities and colleges and technical schools and museums, men of scientific attainments, the result would be economy in cost and increased efficiency.

It ought not to be difficult to fix a mill tax for higher education and to devise a plan by which it should be automatically collected and set apart and distributed by the college and university council in such a way as to do the greatest good to the greatest numbers, and at the same time invite a continuance and increase of the individual munificence so characteristic of Pennsylvania.

A bill was presented to the Legislature of Pennsylvania in March for an automatic distribution of the aid which the state accords to hospitals and charitable institutions; if passed, it would eliminate the methods characteristic of the distribution of state funds by the legislature for purely public charities.

Another bill provides for a charities bureau in the Department of the Auditor General to carry on the duties imposed on the Auditor General and the State Board of Charities.

The purpose of these bills is to make automatic distribution of state revenue to and among hospitals and charities doing the work for the people of the state, on the basis of services rendered, and a method of full returns of receipts and expenditures, with power by inspection to correct extravagance, and to compel economy in expenses of maintenance, and to prevent unnecessary duplication of institutions, but to require of them steady improvement and constant advance in methods and results.

The growing interest and general demand for the mill tax for the support of higher education are shown in recent reports, that for Virginia by Professor Charles D. Maphis, of the University of Virginia; that for Texas by Professor Arthur Lefevre, of the University of Texas; and that for Ohio by President Alston Ellis, of Ohio University. That for Virginia is the report made by a commission to devise a systematic method to meet the demands of higher educational institutions, to prevent educational duplication and consequent financial waste, and to devise stable and systematic methods for the maintenance, management and expansion of these institutions. The report recommends for Virginia one medical school, one polytechnic school, and one university, and a permanent education commission with power to coöperate with the governing bodies of all institutions of higher education in Virginia through representatives.

Professor Maphis has collected and printed the opinions of representatives of the universities of California, Wisconsin, North Dakota, Minnesota, Kentucky, Michigan, Iowa, Illinois, and of the experts of the Carnegie Institute for the Advancement of Education, of New York, and of the Bureau of Education of Washington.

Based on these and other evidence, Virginia is advised to adopt a mill tax for higher education and with and through it to reorganize its institutions of higher education so that they may grow with the growth of the state and with its income and make return in increased work for the state and its people.

In the college and university council of Pennsylvania the state has a capital piece of machinery for the distribution of the proceeds of a state mill tax for higher education. In that council there are the representatives of the state, the governor, the attorney general, and the superintendent of public instruction, and of the universities, Pennsylvania, Pittsburgh, Lehigh and Bucknell, and of the colleges, Washington-Jefferson, State, Franklin & Marshall, and an eminent citizen representing the Catholic institutions of higher education. With such men that council could be safely entrusted with power to make a distribution of any sum raised by a mill tax, so that it can be distributed to the greatest advantage of all the institutions of higher education in Pennsylvania.

The last report of the Superintendent of Education gives a list of six universities, twenty-nine colleges, four law schools, four dental schools, three pharmacy schools, thirteen normal schools and seven technical schools in Pennsylvania.

The state has created many examining boards for law, medicine, pharmacy, dentistry, veterinary candidates, osteopathy, accountants, and boards for the geological and topographic survey, vaccination, health, mining, etc., and all of them might well be affiliated with the college and university council, which could designate university and college experts to carry on the work.

BOOK REVIEWS.

Elementary Chemistry with special Reference to the Chemistry of Medicinal Substances. By H. M. Gordin, Professor of Chemistry in the Schools of Pharmacy and Dentistry of Northwestern University. Vol. I. Inorganic Chemistry. Chicago: Medico-Dental Publishing Company. $3.00.

There are so many books treating of the principles of chemistry, that when a new one is brought upon the Editor's table, he is very apt to put off the consideration of it until it is finally buried out of sight. A book by Professor Gordin is not apt to be thus treated, as he is well known as a painstaking investigator and successful teacher. We are very glad that he has let some of his researches rest for the moment in order to write a text-book upon a subject which he could illuminate so well.

" So far as we know, this book is the only one in which every reaction underlying the tests of purity and identity of medicinal chemicals, particularly those of the United States Pharmacopœia and National Formulary, is adequately explained and illustrated by chemical equations. To mention only a few of the many pharmacopœial reactions that ought to be understood by those interested in medicinal chemicals and that are not treated in the usual textbooks, we may refer to the reaction of hydrobromic acid with copper sulfate and sulfuric acid, the testing of zinc bromide for chlorides, the reaction of mercuric iodide with milk sugar, the reaction of sodium thiosulfate with ferric chloride, the testing of alum for free sulfuric acid, and the reactions involving Gutzeit's test. Dobell's solution, Clemens' solution, sodium perborate, collargol, pyrozone, silver organosole, and numerous other substances handled by the pharmacist and physician are not even mentioned in books that are supposed to be written especially for the healing professions.

"An examination of the very complete index will show that the book contains a wealth of information condensed into a comparatively small bulk, and the information is exact and reliable. By the use of type of two sizes it was possible to separate the elementary matter which is suitable for the beginner from the more advanced information desired by the man behind the dispensing counter."

In general style the arrangement of the matter reminds one of the foreign text-books of which Richter's may be considered to be a type. The treatment of the subject resembles that of Bloxham's work on "Inorganic and Organic Chemistry," and which the reviewer has always regarded among the most valuable of the books treating of the underlying principles in chemistry. Gordin's work, however, has an individuality of its own and may be recommended to all teachers and students in pharmacy, medicine and dentistry.

PHARMACY, THEORETICAL AND PRACTICAL. A Text-book Treating of the General Principles of Theoretical and Practical Pharmacy. By Oscar Oldberg, Dean Emeritus, Northwestern University School of Pharmacy. Chicago: George D. Oglesby.

This is the last book written by Professor Oldberg, whose demise in February of this year (see this JOURNAL, pp. 272–275) was the cause of profound sorrow not only among his former students and associates at Northwestern University but among his colleagues and friends throughout the pharmaceutical world. Professor Oldberg understood students and saw the subjects which he taught from their point of view. He had an unusually happy faculty of knowing how to begin a subject, to develop it, and to keep at it until the student saw every part clearly and was not confused when he had finished with it. It is by reason of this gift as a teacher that he will continue to live through his text-books even when his students and colleagues have gone. He was capable of digesting what he read, to sift the useful from that which was unimportant and to present his knowledge in an original manner and as a finished product. This is well illustrated in his text-book on Pharmacy, the subject of this review. We find fundamental subjects, like the following, considered in distinct chapters: The Brussels Conference; General plans of construction of Pharmacopœias; Differences in purpose of U. S. Pharmacopœia and National Formulary; Principles of Selection of Pharmacopœial Medicines, Nostrums in Pharmacopœias, etc. Under the "Mathematics of Pharmacy" we find it stated "In the absence of national laws defining the exact meaning of the units of length, weight and volume employed in the United States, several individual states undertook to define their respective values. The State of New York passed a law declaring that within its borders a gallon shall be 'the volume of 10 pounds of water at 40° C. in vacuo'—a gallon never before heard of and one that has never been used. Until that law shall have been repealed the use of any other gallon is illegal in that State and a gallon conforming to that law is illegal in all other states and violates the interstate commerce and revenue laws in all states, New York included." With an unusual breadth of mind Professor Oldberg has brought into a single volume an unusual amount of valuable information which is not only valuable but interesting.

All of the various processes employed in practical pharmacy and the principles underlying pharmaceutical manipulations of all kinds, are treated most minutely and extensively. This work will continue to stand as a monument to him who may well rank among the greatest of teachers in pharmacy that this country has produced.

A Critical Revision of the Genus Eucalyptus. By J. H. Maiden (Government Botanist of New South Wales and Director of the Botanic Gardens, Sydney). Vol. II. Part 7. Part XVII of the complete work. (With four plates).

In this part the following species of Eucalyptus are described, together with their synonyms, distribution, and affinities: *Eucalyptus salmonophloia; E. leptopoda; E. squamosa; E. Oldfeildii; E. orbifolia* and *E. pyriformis.* The illustrations accompanying this monograph are excellent and the work is being conducted with the same degree of thoroughness which has characterized the portion already published.

Photomicrographs of Spirochetae, Entamebae, Plasmodia, Trypanosomes, Leishmania, Negri Bodies, and Parasitic Helminths. Office of the Surgeon General, War Department, Washington, D. C., 1913.

Bulletin, No. 1 contains reproductions of a valuable collection of photomicrographs which will be of very great help in the study and diagnosis of these parasites. The text not only describes the methods used in the preparation of the specimens shown, but gives ample directions, clear enough to be followed by every officer of the Medical Corps, for the preparation of similar specimens. The greater number of the negatives are the work of the late Dr. William M. Gray, of the Army Medical Museum, while the text is the work of Capt. Charles F. Craig, assistant curator, Army Medical Museum; Capt. Henry J. Nichols, Medical Corps, instructor, Army Medical School, and Major F. F. Russell, Medical Corps, Curator, Army Medical Museum.

PAPERS BY THE OFFICERS OF THE MEDICAL CORPS, U. S. ARMY, read before the Fifteenth International Congress on Hygiene and Demography, Washington, D. C., September, 1912.

This is Bulletin No. 2 and is published for the instruction of medical officers of the army. It includes some eighteen very valuable papers which were read at the Intrnational Congress on Hygiene and Demography, a report of which was given in this JOURNAL, November, 1912, by Mr. Wilbert.

ANNALES DU MUSEE COLONIAL DE MARSEILLE, fondees en 1893 per M. le professor Dr. Edouard Heckel, et publies sous sa direction. Marseille Musee Colonial 5, Rue Noailles, 5, 1912.

Volume 10 (1912) of this valuable publication contains a number of papers of very great interest, among which the following may be mentioned "The Sapotaceæ of the Group Syderoxylineæ," by Marcel Dubard; "Edible Plants of The French Congo," by M. Baudon; "Analyses of Some Samples of Edible Earth of The French Colonies," by Docteurs Aloy et Bourdin; "Anatomical Studies of Several Species of Kalanchoe of Madagascar," by MM. F. Jadin et A. Juillet; "New Contributions to the Flora of Bourail, being the fifteenth contribution to the flora of New Caledonia," by M. H. Guillaumin; "Anatomical and Morphological Studies of Pelea Madagascarica," by M. A. Juillet; "New Observations of the Plants of New Caledonia," by M. Edouard Hekel; "The Bananas, The Exploitation, Commerce, Culture, and A Systematic Study of the Genus Musa," by M. E. de Wildeman.

It is a matter of great regret to the editor that he cannot give an abstract even of these valuable papers as they are all rich in information and important contributions to the several subjects mentioned.

ANNALES DU MUSEE COLONIAL DE MARSEILLE, fondees en 1893 par M. le professor Dr. Edouard Heckel, et publies sous sa direction. Marseille Musee Colonial 5, Rue Noailles, 5, 1911.

Volume 9 contains seven monographs of equal interest and value as those already mentioned as eminating from the Colonial Museum of Marseilles. They are as follows: "Contribution to the Study of the Structure of the Fruit and Seed of the Clusiaceæ," by M. H.

Jacob de Cordemoy; "Morphological and Anatomical Researches on the Seeds of Ravenala," by M. E. Decrock; "Upon a new Pittosporum of New Caledonia," by M. Marcel Dubard; "Contribution to The Flora of Bourail (New Caledonia)," by M. A. Guillaumin; "Catalogue of the Phanerograms of New Caledonia and its Dependacies," by M. A. Guillaumin; "Upon Sarcocaulon Patersonii Eckl et Zeyh., from the view point of the anatomy and the natural resin of the bark," by M. Louis Planchon; "Upon *Erythrophleum densiflorum* (Elm.) Merr.," by M. Louis Planchon.

NOTES SUR LA MEDECINE ET LA BOTANIQUE DES ANCIEN MEXICAINS, par A. Gerste S. J. Deuxime Edition, Rome, Imprimerie Polyglotte Vaticane, 1910.

A work of very great historical and literary interest dealing with the pre-Columbian medicines, magical medicines including amulettes, the ancient poetical literature, the influence of civilization upon the medicine of Mexico, etc.

PROVINCIAL HOSPITAL PHARMACOPŒIAS, comprising the Formulas for Medicinal Preparations Used in Twenty-five Hospitals and Infirmaries in Great Britain. Published at the offices of "The Chemist and Druggist," 42 Cannon Street, London, E. C. Australia, Adelaide, Melbourne and Sydeny. 1913.

This book is published in conformity to "The Chemist's Dictionary of Synonyms" and the "Chemist's Dictionary of Medical Terms" published by the "Chemist and Druggist" and with which many of our readers are doubtless familiar. The present volume contains formulas for medicinal preparations used in twenty-five hospitals and infirmaries in Great Britain outside of London. The formulas are in a condensed form and will prove to be of very great service to pharmacists and physicians in the United States since it includes excellent examples of up-to-date pharmacy and prescribing.

"THE SPATULA INK FORMULARY, Recipes and Directions for Making all Kinds of Inks for all Purposes," by Dr. J. H. Oyster. The Spatula Publishing Co., Boston, Mass.

The compiler of this book has been collecting formulas for the past thirty-five years and presents a very complete list of ink formulas for every practical purpose. In fact practically all known recipes for inks will be found in this volume. The opening chapter is devoted to "the Art of Making Ink." This is followed by formulas and directions for making inks and writing fluids of all kinds and colors. Much other cognate information is also given. Some of the subjects treated are: How to make ink permanent, to freshen old writing, preservation of inks, to restore faded writing, ink powders and tablets, invisible and sympathetic inks, ink erasers, blotting paper, inks for rubber stamps and hectographs, typewriter ribbons, inks to write on celluloid, glass, porcelain, show cards, photographs, sacks, wood, steel, tin, zinc, etc., respectively; sheep marking ink, shoemaker's ink, printing inks, pencils to write on glass and metals, etc., etc.

E. MERCK'S ANNUAL REPORT OF RECENT ADVANCES IN PHARMACEUTICAL CHEMISTRY AND THERAPEUTICS. Vol. XXV, E. Merck Chemical Works, Darmstadt, 1912.

Those of us who have used these "Annual Reports of Merck" have come to rely upon them for the well digested information and succinct summaries they contain of recent discoveries in the field of pharmaco-therapy. The Reports deal not only with substances eminating only from the Merck Chemical house, but all the newer preparations and drugs that have a scientific basis for their introduction into medicine. The editor's view of the value of this work is best shown probably by the fact that we republished in its entirety in the January issue of this JOURNAL the article on the "Digitalis Glucocides and Allied Drugs" taken from this volume. This is the clearest and best presentation of this subject that we have ever seen and well illustrates the broad spirit that dominates E. Merck & Co. in issuing this publication.

REPORT OF LEHN AND FINK'S ANALYTICAL DEPARTMENT FOR 1910–1912. Issued by Lehn and Fink, New York, January, 1913.

This report contains a great deal of analytical data on the examination of nearly a hundred different substances. We are very fortunate in having this information in a form that is available for reference and we hope that it may be possible for us to publish from time to time some of the results incorporated in this volume. This has already been done in the case of "Haarlem oil" in our June issue.

SEMI-ANNUAL REPORT ON ESSENTIAL OILS, SYNTHETIC PERFUMES, ETC. Published by Schimmel & Co. (Fritzsche Brothers), Miltitz, near Leipzig, London, New York, April, 1913.

Essential oils whether viewed from the scientific or commercial point of view are among the most interesting of plant constituents.

We cannot expect to keep up with the scientific developments let alone the manifold applications to which they are constantly being applied by merely attempting to read the more or less isolated publications in the literature. Then, too, it is exceedingly difficult for the average student to distinguish the information published and which is genuine from that which is false. During these many years we have come to rely upon the Semi-Annual Reports of Schimmel & Co., and we look forward each spring and fall to these publications.

The present volume contains as a frontispiece an excellent portrait of Mr. Carl Brucker, who was the senior resident partner of the firm of Fritzsche Brothers of New York. Mr. Brucker played a large part in the development of this firm's business in the United States. He was a man of sterling character, untiring industry and his genial disposition endeared him to all who had any relations with him.

COLLECTED PAPERS FROM THE RESEARCH LABORATORY OF PARKE, DAVIS AND CO., Detroit, Mich. Reprints, Vol. 1, 1913.

In this volume we have a collection of some thirty articles representing the research work which has emanated from the Reasearch Laboratory of Parke, Davis and Company. The articles are by different members of the staff and have been published in the different medical, pharmaceutical and health publications of Europe and the United States. They cover a wide range of subjects extending from the histological study of drugs to bio-chemical studies of all kinds. In this form the papers are conveniently arranged for reference and it is to be hoped that the present plan will be continued in the future.

PROCEEDINGS OF FIRST ANNUAL MEETING OF NATIONAL ASSOCIATION OF MANUFACTURERS OF MEDICINAL PRODUCTS. Held at the Waldorf-Astoria Hotel, February 6 and 7, 1912–1913.

The National Association of Manufacturers of Medicinal Products was formed to maintain high standards in the manufacturing and marketing of medicinal products; to insure to individual members the just and proper reward of initiative, discovery and invention; to prevent fraudulent practices in the drug trade; to encourage the lawful enforcement of sound drug legislation, and effect the official observance of the fundamental law of the land; to prevent the subversion of the law to factional purposes; to amicably adjust differences; to advance uniform and just drug legislation; and in other lawful ways to promote the welfare of and fraternity among those engaged in the manufacture of therapeutic agents for the use of the medical and allied professions.

This association has it within its power to wield a beneficient influence in all that pertains to the control, supply and sale of medicinal products. We doubt not but that the association has in mind the opportunities and responsibilities of such an organization of representative manufacturers. It would seem that if this Association had done nothing more since its organization than to invite Dr. Carl L. Alsberg, Chief of the Bureau of Chemistry, U. S. Department of Agriculture, to address the members and for Dr. Alsberg to accept the invitation that the organization would have been well worth while. It was an unusual opportunity for Dr. Alsberg and his address which is printed in the Proceedings has done much to assure manufacturers and others that he has a through comprehension of the situation and that he will meet the questions as they arise with just and decisive action.

The present officers of the Association are: President, Frank G. Ryan, of Parke, Davis & Co., Detroit; Vice-President, Adolph G. Rosengarten, of Powers-Weightman-Rosengarten Co., Philadelphia; Treasurer, Henry C. Lovis, of Seabury & Johnson, New York; Secretary, Charles M. Woodruff, of Detroit.

STARVING AMERICA. By Alfred W. McCann, Member of Vigilance Committee, the Associated Advertising Clubs of America. F. M. Barton, Publisher, Cleveland and New York. 12mo., 270 pp., $2.00.

The signs of a popular awakening upon the subject of the food we eat are to be found in the increasing number of magazine articles and books about it written by authors who possess the ability to present scientific matters in a form intelligible to everybody.

In the book called "Starving America," Mr. McCann, who wields a "pen with a punch," places the subject of the mineral matter in the food we eat in a position of great importance, where it properly belongs.

Mr. McCann has long been connected with the food industries along the lines of manufacturing, advertising and selling, and he combines with this practical knowledge a comprehension of scientific facts which makes his writings instructive as well as entertaining to the reader. Some of the chapter headings selected at random will give a better insight into the character of the book than any long drawn out review which might take the place of reading the book for some people: "Fifteen Million Defective Children; What the Minerals Do; Ferments; Minerals Lost or Changed; White Bread Starvation; Polished Rice; Other Nations Alarmed; Candy, Ice Creams and Other Foods; Food Adulterations; Food Preservatives; Labels that Mislead; The Poison Squad; Keeping Foods; What to Feed the Child; Food Experiments in Schools; An Ideal Restaurant; For Physicians Only."

Mr. McCann's information regarding many phases of the subject is obtained from the official reports on food inspection in a number of States. The book is entertainingly and convincingly written and should be read by manufacturer, advertiser, chemist and consumer alike.

CHARLES H. LAWALL.

HEALTH AND LONGEVITY THROUGH RATIONAL DIET. By Dr. Arnold Lorand, Physician to the Baths, Carlsbad, Austria. Royal Octavo, 416 pp., $2.50. F. A. Davis Co., Philadelphia.

Many books have been written upon the subject of dietetics by cranks and faddists but few are known which combine such a thorough grasp of the subject with such an interesting manner of treating it as is seen in this work, the introduction to which has been written by Dr. Victor C. Vaughan, who personally endorses the book in its important points and especially as regards its freedom from fads. In the preface Dr. Lorand says: "Probably but very few physicians have so frequently an opportunity to observe the harmful consequences of a faulty mode of nourishment as one who is practicing as a Carlsbad Bath Physician. It is a surprising fact that even scholars well versed in a variety of subjects often display the veriest ignorance or show the greatest carelessness precisely in respect to what and the manner in which they eat. Others again fall into the opposite error—those, for example, who studiously avoid all foods containing even a trace of uric acid forming constituents, lest an excess of such substances prove injurious, and meanwhile overlook the fact that in addition to such uric acid producing components these foods contain many other important substances, *e.g.*, certain nutritive salts, an insufficient intake of which may result in serious injury, particularly in the period of growth and development of the body."

The subject is comprehensively considered in a logically arranged manner, beginning with the fundamental facts such as the influence of food upon man, the fundamental laws of feeding, injurious modes of feeding, good and evil effects of various food substances, vegetarianism, etc. Abundant information is included regarding specific details relating to the composition of foods. Tables showing the comparative value of various foods expressed in terms of some definite constituent as lime, phosphorus, iron, etc., are inserted in their proper places in the text and as a very comprehensive index is found at the close of the book it makes a very valuable work of reference to the busy chemist or physician who frequently has immediate use for such information, which is sometimes difficult to locate. These tables are all credited to the proper authorities and the original references to literature are usually given as well.

Some of the statements evidently are based upon conditions observed in Europe, for on page 191 the author says of oleomargarine "lately the animal fat has largely been replaced by vegetable fats which would not of itself be so bad were it not that they are often of an inferior quality. Instead of using the finer grade of edible oils the very poorest are used, and the melted animal fat which forms the principal constituent of oleomargarine is mostly replaced by tallow." This condition certainly does not exist in America at the present time.

The keynote of the book is found in the following epitomized summary in the concluding chapter. "Under-nutrition prevents young people from attaining a ripe old age and over-nutrition carries those of advanced age prematurely to their grave. Consequently the requirements are: More nourishing food for the young growing organism and moderation in the succeeding periods of life."

The book is interesting to read and valuable to possess as a library volume. CHARLES H. LAWALL.

FOOD AND FLAVOR. By Henry T. Finck; 12mo., 594 pp. The Century Co., New York, $2.00.

Of all recent books treating of the subject dearest to the heart of man, foods, the book with the foregoing alliterative title has attracted and deserves the most attention. The author combines the experience of an epicure with the observations of a cosmopolite and gives us the product in a form that makes the mouth water and stimulates the jaded appetite. It is dedicated to "Luther Burbank and Harvey W. Wiley, the two men who have done most to make our daily food palatable and honest."

The book pays tribute to Fred W. Harvey, the famous restaurateur of the West, and Horace Fletcher, who is so consistent in his views that his last lecture in Philadelphia was delivered in Chew Street, Germantown. It also abounds in references to famous culinary artists and epicures of all time, from Brillat-Savarin down to Soyer of paper bag cookery reputation. It will doubtless surprise many to learn that Dumas was the author of a "Dictionary of Cuisine," a "monumental contribution to the art of cooking and eating."

To describe and classify gastronomic pleasures as is done with artistic effect in music, sculpture and painting, is surely a new venture and one in which the author is convincingly able. A new nomenclature will doubtless arise to do justice to the subject, as already we encounter such appealing phrases as "overtones of flavor" and "culinary discords."

The descriptions of foreign markets are alone worth reading the book to enjoy, especially the chapter entitled "French Supremacy."

It is a pity that the author has not informed himself more accurately upon some of the minor points where he seems to have been influenced by sensational newspaper writers or by pseudo-scientific articles appearing in the magazines. For instance, in speaking of vinegar adulterated with distilled acetic acid he says, "This so-called vinegar is in most cases injurious to the health of those who consume it," and under the paw-paw (the fruit of *Asimina triloba*) he says, "Papain is much used as a substitute for soda mints," evidently ignorant of the fact that the paw-paw fruit which yields papain is from a tropical tree of the species *Carica papaya,* entirely different and distinct from the United States paw-paw, which contains no digestive ferment.

A few "bad spells" mar the work, among which are "interstate" for "intrastate" on page 34, "sarsprilla" for "sarsaparilla" on page 62, "analine" for "aniline" on page 100 and "wool alcohol" for "wood alcohol" on page 228. These are unusual in a work of this character, especially one published by a firm of such high standing as the Century Co. and are to be deprecated because such a book reaches many who cannot correct errors of this kind as they read and are likely to be misinformed in these particulars on this account.

The book can be read with pleasure and profit alike and should have a marked influence upon the cuisine of the future, inasmuch as it inaugurates a new era and gives a new viewpoint upon the subject.

CHARLES H. LAWALL.

THE AMERICAN
JOURNAL OF PHARMACY

OCTOBER, 1913

SOLVENTS FOR ALKALOIDS AND ALKALOIDAL SALTS.

By George L. Schaefer.

For the last few years I have made use of methylalcohol and mixtures of it with other liquids to extract alkaloids from raw materials and to determine the alkaloids in all kinds of raw materials and pharmaceutical products. Methylalcohol is in the market of highest purity at a low price under various names, such as Columbian spirits, Colonial spirits and others, and is in many cases a far better solvent for alkaloids than the more expensive ethylalcohol, and its use for laboratories and analytical purposes is therefore often to be preferred. Mixtures of methylalcohol with other solvents can also be used with advantage according to the nature of the testing material. Such solvents are benzol, toluol, chloroform, fusel oil, ether, acetone and others. Especially mixtures with benzol or chloroform are very good solvents. In many cases, where the alkaloid is little or not soluble in chloroform, benzol, etc., a small quantity of methylalcohol added to these liquids will render it easily soluble. These mixtures are to be preferred in place of pure methylalcohol in the presence of extractive or coloring matter as well as of inorganic substances, which might be more or less soluble in methylalcohol, but are not soluble in the proper mixture.

I have found methylalcohol to be especially an excellent solvent for morphine alkaloid, as also are mixtures with some of the liquids mentioned before, especially with chloroform and benzol. These solvents enable the chemist to extract and to determine morphine quickly and quantitatively from its salts or preparations in the cold with a small amount of the liquid. The testing material must be dry or nearly so, as the solubility of morphine alkaloid in methylalcohol is decreased by water. Pure commercial methylalcohol of 98–99 per cent. dissolves crystallized alkaloid morphine easily in the proportion of 1 grm. to 15 c.c., while of methylalcohol of 80 per cent. 200 c.c. are required for solution at 25° C.

Chloroform, benzol and other liquids are separated out by water from the methylalcoholic mixture. The solubility of morphine salts in methylalcohol is increased by water.

For the determination of morphine in dry preparations, salts, pills, tablets, etc., the testing material corresponding to about 0.3 grm. of morphine, is to be finely triturated in a small mortar with a sufficient quantity of purified sharp sand under the addition of an excess of bicarbonate of soda, carbonate of lime or magnesia, etc., and the mixture moistened with as little water as possible. The mass is allowed to dry out slowly in the mortar, exposing it to a temperature of 30–40° C., occasionally triturating until dry. The mixture is transferred to an Erlenmeyer flask, the mortar cleaned with sand and, if necessary, washed with a few cubic centimetres of the solvent to remove all traces of the alkaloid to the flask. About 30–40 c.c. of a freshly made mixture of 1 vol. methylalcohol and 4 vol. of chloroform is added and the flask allowed to stand for 1 hour, moderately but frequently shaking the same. A mixture of 1 vol. methylalcohol and 4 vol. of benzol can also be used. The liquid is filtered off through a small filter and the residue thoroughly washed 3–4 times with about 10 c.c. each time of the solvent. The solution is distilled off, the residue taken up with N/20 sulphuric acid and the excess of the acid titrated in the usual way, using cochineal or methyl red as indicator.

I found mixtures of methylalcohol with chloroform or benzol in the proportion 1:4 to give the most satisfactory results, while, however, the solvent power of the liquid can be increased if circumstances require it, using as solvents pure commercial methylacohol or a mixture containing a higher percentage of it. At 25° C. methylalcohol dissolves U.S.P. alkaloid morphine 1 grm. in 15 c.c., a mixture of 1 vol. methylalcohol and 4 vol. of chloroform dissolves the alkaloid 1:22 c.c., 1:4 vol. benzol mixture dissolves it in the proportion 1:40 c.c. whilst it is soluble in 15 c.c. of a mixture of 1:2 vol. chloroform and in 25 c.c. of 1:2 vol. benzol. Mixtures with methylalcohol cannot be used to determine morphine from aqueous solutions of morphine salts by the shaking out process. For this purpose I have used for years as a very convenient solvent a mixture of

	Ethyl alcohol	Methyl alcohol.	Chloroform	Benzol	Ethyl alcohol 1 vol. Chloroform 4 vol.	Ethyl alcohol 1 vol. Benzol 4 vol.	Methyl alcohol 1 vol. Chloroform 4 vol.	Methyl alcohol 1 vol. Benzol 4 vol.	
Morphine alkaloid cryst..	1 : 258	1 : 15	1 : 2500	insoluble	1 : 150	1 : 500	1 : 22	1 : 40	
Morphine sulphate......	1 : 560	{ 1 : 50 1 : 437	insoluble	insoluble	1 : 6100	1 : 7500	1 : 455	1 : 1500	{ 95% alcohol 1 : 500 c.c. 85% alcohol 1 : 250 c.c. 80% alcohol 1 : 130 c.c.
Morphine muriate.......	1 : 165	{ 1 : 25 1 : 95	insoluble	insoluble	1 : 555	1 : 1120	{ 1 : 50 1 : 150	1 : 395	{ 95% alcohol 1 : 165 c.c. 85% alcohol 1 : 85 c.c. 80% alcohol 1 : 50 c.c.
Codeine alkaloid........	1 : 2	1 : 2	1 : ½	1 : 10	1 : 1	1 : 1½	1 : 1	1 : 1	
Codeine sulphate........	1 : 1260	1 : 225	1 : 9000	insoluble	1 : 1090	1 : 2100	1 : 60	1 : 333	
Diacetyl-morphine alkaloid................	1 : 33	1 : 25	1 : 1½	1 : 8	1 : 1½	1 : 4	1 : 1½	1 : 4	
Hydrochloride of diacetyl-morphine.........	1 : 11	1 : 9	1 : 3	insoluble	1 : 22	1 : 140	1 : 5	1 : 15	
Ethyl-morphine hydrochloride..............	1 : 25	1½	1 : 190	insoluble	1 : 20	1 : 88	1 : 5	1 : 12	
Caffeine...............	1 : 95	1 : 110	1 : 5½	1 : 98	1 : 6	1 : 35	1 : 4	1 : 20	
Quinine alkaloid........	1 : 075	1 : 1½	1 : 2	1 : 180	1 : 2	1 : 2	1 : 3	1 : 4	
Cinchonidine alkaloid ...	1 : 25	1 : 17	1 : 3½	1 : 900	1 : 3½	1 : 22	1 : 3½	1 : 9	
Cinchonine alkaloid	1 : 205	1 : 160	1 : 110	1 : 2000	1 : 18	1 : 75	1 : 16	1 : 40	
Quininidine alkaloid	1 : 45	1 : 150	1 : 4	1 : 84	1 : 3	1 : 8	1 : 4	1 : 15	
Quinine sulphate	1 : 250	1 : 32	1 : 370	insoluble	1 : 8	1 : 190	1 : 5	1 : 21	
Cinchonidine sulphate...	1 : 150	1 : 3½	1 : 650	insoluble	1 : 5	1 : 65	1 : 5	1 : 11	
Cinchonine sulphate.....	1 13	1 : 1½	1 : 100	insoluble	1 : 2½	1 : 14	1 : 3½	1 : 3½	
Quinidin sulphate.......	1 : 20	1 : 2½	1 : 12	insoluble	1 : 3	1 : 12	1 : 3	1 : 5	
Strychnine alkaloid......	1 : 182	1 : 250	1 : 6½	1 : 150	1 : 4	1 : 20	1 : 4	1 : 15	
Strychnine sulphate.....	1 : 125cc	1 : 12	1 : 233	insoluble	1 : 8	1 : 140	1 : 4	1 : 8	
Strychnine nitrate.......	1 : 270	1 : 290	1 : 80	insoluble	1 : 20	1 : 150	1 : 25	1 : 100	
Brucine alkaloid........	1 : 1½	1 : 1	1 : 5	1 : 60	1 : 3	1 : 3	1 : 1½	1 : 2	
Brucine sulphate........	1 : 360	1 : 60	1 : 166	insoluble	1 : 20	1 : 555	1 : 5	1 : 18	

the lower fractions of fusel oil with chloroform. I take the fraction obtained from raw fusel oil, which distils between 90° C. and 110° C. The distillate is separated from water and the oil shaken twice with one-half of its volume of saturated salt solution. This oil is shaken with dry calcined sodium or potassium carbonate to remove most of the water in solution and then mixed 1 : 1 vol. with chloroform. If the resulting mixture is milky it has to be shaken again with calcined carbonate of potash or soda until perfectly clear. This mixture dissolves alkaloid morphine crystals readily when hot in the proportion 1 grm. to 60 c.c., when cold 1 : 140 c.c. Alkaloid morphine freshly liberated by an alkali from an aqueous solution of a morphine salt in the presence of the solvent and shaken out at once in the amorphous state, is taken up by this mixture in the proportion 1 grm.: 80 c.c. at 25° C. The mixture is not very liable to form emulsions and can easily and completely be evaporated at a low temperature on a water bath, leaving the morphine as a white residue, which can be titrated in the usual way.

I add a table showing the number of cubic centimetres of different solvents required to form a clear solution with 1 grm. of the most important alkaloids and salts at a temperature of 25° C. This table might be of interest to pharmaceutical chemists for analytical purposes.

Morphine hydrochloride and morphine sulphate with the full amount of water of crystallization dissolve easily in cold methyl-alcohol, but after some time the solution begins to separate out salts containing only 2 molecules of water of crystallization. These salts require much more of the solvents for resolution. The table therefore shows 2 numbers for these salts, the lower number showing the solubility of the U.S.P. salts and the higher the amount of cubic centimetres required for resolution of the separated crystals.

LABORATORY NEW YORK QUININE AND CHEMICAL WORKS (LTD.).

SOME RECENT LEGISLATION RELATING TO POISONS AND HABIT-FORMING DRUGS.

BY. M. I. WILBERT, Washington, D. C.

In compliance with a request made by the Conference of State and Provincial Boards of Health, in June, 1909, the Public Health Service of the United States has undertaken to compile and classify the laws relating to public health matters. Up to the present time the laws relating to six different subjects have been compiled and published in the form of Public Health Bulletins. One of these, Bulletin 56, "Digest of Laws and Regulations in Force in the United States Relating to the Possession, Use, Sale, and Manufacture of Poisons and Habit-Forming Drugs," is of direct interest to pharmacists in that an effort has been made to reflect not alone the laws relating to the manufacture and use of poisons, but also to refer in outline, at least, to the laws regulating the practice of pharmacy and the sale of poisons. For ready comparison, the requirements under the several laws have been compiled in the form of tables which clearly indicate the need for careful study in the enactment of future legislation on this subject.

To keep the material up to date, the recent legislation is being compiled and published in Public Health Reports and in this way the several publications are constantly available as works of reference to all who may be interested.

During the legislative year of 1912-1913, the legislatures of some 42 states were in session and the resulting laws more or less directly affecting pharmacy were not alone numerous but, in some instances at least, also far reaching. Among the more radical pieces of legislation are the Walker cocaine bill in New York and the transfer of the enforcement of the drug law in Ohio from the Board of Pharmacy to a commission.

Among the notable failures to secure desirable and evidently needed legislation a good illustration is to be found in Pennsylvania where the pharmacists failed to secure favorable action by the Senate on a bill designed to codify and somewhat elaborate the present laws relating to the practice of pharmacy. Pharmacists also failed to secure the approval of the Governor of the State for an antinarcotic bill that had passed both houses of the legislature and succeeded in defeating a bill designed to prevent the promiscuous sale of corrosive sublimate in tablet form.

The successes and failures of the past legislative year evidence the fact that many of the measures offered were hastily and carelessly drafted, or were subsequently so amended as to make them difficult of enforcement. Little or no attention appears to have been given to the need for greater uniformity in legislation relating to public health matters and in connection with habit-forming drugs additional inducements have been placed on illicit traffic.

To make the existing legislation effective an effort should be made to have the laws enforced to the letter and wherever found irksome or impracticable the laws should be so amended as to effectually safeguard the interests of the public without inflicting unnecessary hardships on honest dealers and manufacturers.

In the succeeding enumeration an effort has been made to call attention to the laws relating to matters of public health which directly or indirectly affect the pharmacist or are designed to restrict the manufacture, sale or use of poisons and habit-forming drugs.

Much of this information is based on news items in pharmaceutical or other journals and the compilation as presented here is therefore suggestive rather than authoritative.

Alaska.—The first legislature of the Territory of Alaska has adopted several laws relating to public health matters, among others, laws regulating the practice of medicine and of pharmacy.

Arizona adopted new laws regulating the practice of medicine and the practice of pharmacy and the sale of poisons; also enacted a pure food law.

Colorado enacted an antinarcotic law, a law to restrict the sale of carbolic acid and a modification of its pure food law.

District of Columbia.—The annual appropriation bill for the District of Columbia includes a revision of the existing laws relating to the sale of intoxicating liquors. This revision restricts the sale of alcoholic beverages and non-medicated alcohol in drug stores to physicians' prescriptions and requires that a special record be provided for such prescriptions.

Idaho has enacted amendments to the food laws and to the poison laws.

Illinois enacted amendments to the pharmacy laws.

Indiana adopted a revised antinarcotic law and a modification of the law regulating the practice of pharmacy.

Kansas adopted amendments to the pharmacy law.

Maine enacted a law regulating the sale of habit-forming drugs.

Massachusetts enacted several measures designed to strengthen the pharmacy laws; also adopted a law requiring notification of cases of occupational diseases.

Missouri adopted a law designed to restrict occupational diseases.

Montana adopted amendments to the pharmacy law.

Nevada enacted a new pharmacy law and a law to regulate the sale of poisons and of narcotics.

New Jersey adopted a law regulating the sale and manufacture of insecticides and also a law designed to restrict the sale of methyl alcohol.

New York enacted the Walker bill to restrict the sale of cocaine; also adopted an amendment to the pure food and drug law.

North Dakota adopted laws to prohibit the sale and the use of snuff and of cigarettes.

Ohio enacted a law placing the enforcement of food and drugs laws in the hands of a commission; also provides for the revocation of certificates to practice pharmacy and enacted an amendment to the laws regulating the sale and use of narcotics a law relating to the misbranding of drugs and a law designed to prevent occupational intoxications.

Oregon enacted a revised law to regulate the practice of pharmacy, sale of poisons and sale and use of narcotic drugs, also adopted a law forbidding the advertisement of cures for venereal diseases in newspapers and making the editor of the newspaper equally liable with the advertiser.

Pennsylvania enacted a law designed to prevent lead poisoning.

Rhode Island penalizes the promiscuous distribution or giving away of medicine or other article which contains any drug or poison.

Vermont enacted an amendment to the food and drugs law; also adopted a regulation making venereal diseases reportable.

Wisconsin adopted a law designed to restrict the sale of habit-forming drugs; also a law which requires the reporting of venereal diseases.

Wyoming adopted an amendment of the law regulating the sale of habit-forming drugs; also an amendment to the pure food law.

THE REGULATION OF DEGREES.[1]

By A. B. Stevens.

Doubtless the question of regulating degrees given by colleges and schools of pharmacy will be considered by the Pharmaceutical Conference of Teaching Colleges. It ought to be perfectly feasible for the Conference to state what degrees they will recognize and the conditions under which such degrees should be given in order to receive recognition. As this is a question of national importance it certainly should be settled by the Conference. It is unfortunate that any single state should have undertaken to settle this question. We certainly realize that New York State has a perfect right to make its own laws and state what qualifications they will require for registration, but there is a question as to their right to name the degree that shall be given by all colleges for a certain amount of work. The object of any state pharmaceutical law should be the protection of the people. It is not the degree but the work that counts for the public protection. It seems unreasonable to refuse a candidate for registration an examination because he has a certain degree when he would be admitted with the same qualifications if he had another degree. Do not for a moment think that I am opposed to the regulation of degrees, but I do maintain that they should be regulated by the Conference and that it would have been far better if New York State, instead of adopting a fixed standard, had made their recommendations to the Conference. It must be remembered that New York has only one class of colleges, while there is an entirely different class in other states which is entitled to consideration.

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[1] Read at the Nashville meeting of the American Conference of Pharmaceutical Faculties, August, 1913.

In considering degrees and their requirements one thing should be kept in mind, and that is how such action will affect our standing in the educational world. The degree of Graduate in Pharmacy and that of Pharmaceutical Chemist are purely pharmaceutical degrees and in no way related to other educational degrees. Not so with that of Bachelor of Science, which has a recognized standard, being given for four full academic years. Just as soon as we give this degree for anything less than that, we shall cut our own throats. We cannot afford to do anything that will lower our standing among educational institutions. The degree of Bachelor of Science has been given by a few university schools of pharmacy, who have maintained its previous high standing, and I believe that they have the right to insist that the Conference should not recognize any institution that gives this degree for any less than the customary amount of work. If independent colleges or those affiliated with universities are not so situated that they can meet these requirements let them refrain from giving the degree until such time as they can conscientiously meet them. I fully believe that any institution which grants the Bachelor of Science degree for four years of three days a week will not only lower its own standard among educational institutions but will also lower the standing of the degree as given by other colleges. I therefore hope that the institution which has already announced its intention of so doing will recognize this fact and withdraw its offer to grant this degree, or, increase its requirements to meet the recognized standard.

Turning now to the degree of Doctor of Pharmacy, on the one hand we have a degree which has been granted for two or three years of work in pharmacy, and on the other, we find the Educational Department of the State of New York endeavoring to elevate this degree to the highest position. This I believe to be an impossible task, for it would be hard to conceive of anyone being willing to work six or seven years for a degree, that has already been given for two or three years of work. Should an unsophisticated person start out on such a course he would doubtless find out sooner or later that he had made a mistake and then he would work for the degree of Doctor of Philosophy. We believe that the degree, Doctor of Pharmacy, has already fallen into disrepute. One college that formerly gave the degree has announced that the degree will no longer be given. Professor Jordan has very ably pointed out the fact that the abbreviation, Pharm. D., is so similar to Ph. D. that by dropping the "arm." it becomes identical with the latter. This might lead to dishonesty on the part of unscrupulous persons or to humiliation for the conscientious. In view of the above facts I offer the following:

Resolved. That the degree of Doctor of Pharmacy be not granted by members of the Pharmaceutical Conference.

Resolved, That the degree of Bachelor of Science be not given for less than four full years of collegiate work, requiring not less than 120 hours of credit, an hour of credit being understood to be one hour of class work or two hours of laboratory work each week for 16 or 18 weeks.

LANDMARKS OF PHARMACY.[1]

By Charles H. LaWall.

A landmark, aside from its concrete meaning of a "boundary mark to a tract of land," is a word used figuratively to indicate a distinguishing characteristic, variation or event; "that which marks a turning point"; "something that serves to distinguish a particular period of time or point in progress of transition."

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[1] Read at the annual meeting of the Pennsylvania Pharmaceutical Association, June, 1913.

The important landmarks of pharmacy are the words used to designate the practitioner of this profession, and much interesting history may be learned from an etymological study of the subject and a reference to the history of pharmacy.

The early history of pharmacy, like that of most other professions, is wrapped in obscurity, inasmuch as the practice of medicine, together with the preparation and administration of drugs, was so closely associated with superstitious beliefs and occult practices and the employment of magic or astrology, that no sharp line of demarcation can be drawn between the members of the various professions which are now associated with the art of healing.

The earliest authentic references to the preparation and use of drugs are those of Egyptian origin, particularly in the Papyrus Ebers, which indicate that at that early date the priest was likewise the physician and the compounder and dispenser of medicinal substances. Even in that early time (about 1600 B.C.) it was a criminal offence to add to or vary the ingredients in a prescription, indicating to a certain extent a separation of prescriber from dispenser, but we are not given any information as to the designations of these sub-members of the class of priest-physicians.

The next oldest references are those of the Bible, which date, so far as the actual existing manuscripts are concerned, from a time long after the Christian Era (a fact not generally known), although the Papyrus Ebers itself, the original manuscript of which is still in existence in the British Museum, gives evidence of having been compiled at about the period when Moses was in Egypt. The accurate interpretation of such early manuscripts as the Papyrus Ebers of the 15th century B.C. and of the oldest existing manuscript of the Bible, which date from about the 8th century A.D. or more than 2000 years later, is attended with much uncertainty on account of our unfamiliarity with the exact meanings of words in those early periods.

In the Bible, for instance, the root word which is translated in earlier revisions as "apothecary" in such references as the classic "after the art of the apothecary" is "Rakach" (assuming, of course, that the vowels are correct, for all early Hebrew manuscripts are entirely composed of consonants), which in the Revised

Version is now translated as "the perfumer" and indeed, it is probable that the principal office of the Hebrew apothecary was connected with the compounding of perfumes, incense, anointing oils, pomades, etc., for there are no distinct references in the Bible to any medicine for internal administration. The connection between the priests and physicians did not exist as in Egypt.

The word "apothecary" itself is of more modern origin, being derived from the Latin "apothec," which originally meant a warehouse, particularly of drugs, the apothecary really being a warehouse man, corresponding more closely to the wholesale druggist of to-day than to the retailer. The same root gives rise to the French "Apothecaire," the "Boticario" of the Spanish and Portuguese; the "Bottejago" of the Italian; the "Apotheke" of the Dutch, German and Danish and the "Apothecare" of the Swedish, all of which words are used to designate the practitioner of the art. The word "apothec" itself, meaning the repository or warehouse, gives rise also to the Spanish "Botica" (of which a variant form means a wine cellar), the Italian "Bottega"; the Dutch "Apotheck"; the Danish and Swedish "Apothek" and the German "Apotheke."

In ancient Greece the word pharmacy had its origin in a word "Pharmakon," which meant eventually a drug, medicine or a poison, but the root of which meant simply "to mix," and the transition stages of the word included meanings connected with noxious or poisonous drugs and with sorcery. In the New Testament (the principal original manuscripts of which are in Greek) the word "Pharmakeia," wherever it occurs, is translated "sorcery" or some similar word. The Pharmakotribae of early Greece were the drug grinders and although history is not quite clear upon the subject, they may have been compounders as well and assistants to the Seplasarii, who were ointment makers principally. The herbalists of that period were called "Botanologoi" and the root cutters were "Rhizotomoi."

The Greek word "Pharmakopoeus" meant a purveyor of toxic drugs and was used in a disreputable sense. The "Pharmacopoloi" of Greece were the traveling quack doctors and the classification was sometimes made as a term of reproach, as where Epicurus sneeringly refers to the fact that Aristotle was one of the Pharmacopoloi in the early days before he became a philosopher. The most disreputable association of the same root word by the Greeks was in "Pharmakoi," a term applied to condemned criminals.

The Greek words referred to have given rise to our present words "Pharmacy" and its associated words, as "pharmacist," "pharmaceutical," etc., and the same root has produced the French "pharmacien," the Portuguese "pharmacia" and the Spanish and Italian "farmacia," having an equivalent meaning to pharmacy. The newer use of the word "pharmacology" to include the sum of scientific knowledge concerning drugs is therefore founded upon correct etymological principles but finds few users and fewer adherents because of its more widespread use as a word equivalent to "pharmacodynamics," the study of the action of drugs.

In Rome, at the same period when the "Apothec" was the warehouse for drugs, there was no single word describing the practitioner of pharmacy. As in Greece, the Seplasarii were ointment makers while the Pigmentarii were sellers of dyes and colors. As an interesting sidelight in comparison with present day conditions it is said that Pliny reproached some of his rivals with purchasing their medicines from the Seplasarii without knowing anything of their composition. Seplasia was the name, however, for the place where drugs were sold, as was also Medicina, while "medicamentus" meant either a medicine or a poison and the "medicamentarius" was not only one who prepared and administered the drugs ordered by the physician, but was also a poisoner (as in the Greek "pharmakopeus"). The physicians of that date evidently confined their activities almost entirely to diagnosing and prescribing, as we find as another subclass similar to the medicamentarii the "vulnerarii" or those who treated wounds, equivalent in a minor sense to the surgeon of to-day.

There were also at that time "confectionarii" or compounders of medicines (the word "confection" from "con" and "facere," to put together, is also used sometimes in this sense) and "stationarii" who supplied the compounders with their raw materials and were therefore a subclass of wholesalers, standing between the "apotheca" or warehouseman and the "confectionarius" or compounder. Longfellow, in his Golden Legend, refers to the latter as follows:

"To report if any confectionarius
Mingles his drugs with matters various."

While the Arabs are responsible for the separation of pharmacy from its other associations and its elevation to the plane of a dignified profession (from which, by the way, it later descended, as we shall see) it is strange that little was contributed by them to the landmarks in the shape of the terms used to designate the practitioners of the art. The words "alkali" and "alcohol" are instances of words of Arabian origin in common use, but the word "chemistry" (through alchemist) is the only word of importance in connection with the present article. The prefix "al" of the Arabians means "the" and the word "alchemy" is supposed to come from "al-chyma," the latter portion of the word, according to some authorities, meaning melted or poured out (referring to the practices used in the art) while the original root is "Khem" (the ancient name of Egypt) meaning "black" in recognition of the dark color of the soil, wherefore the practice of alchemy was logically the practice of the black art. It is well known, however, that the alchemists, while reaching for the unattainable accumulated a mass of facts which later, when classified, led to the development of the present science of chemistry.

The word "drug" is of more modern origin and comes from a root word signifying "dry herbs" and is found in a number of languages, as German, "Droge"; Spanish, Portuguese and Italian "Droga" and French "Drogue."

In the 15th and 16th centuries in France, pharmacists or "appotecarii" were officially classed with "épiciers" or grocers, and in a Paris ordinance of 1514 it is declared that "though the apothecary is always a grocer, the grocer is not necessarily an apothecary." In 1777 the separation of these two classes of tradesmen was finally effected in France.

In Great Britain in about the same period, the retail trade in drugs, spices and other commodities was carried on by the mercers (from "merx," the root word from which we derive merchandise).

There were numerous guilds, such as pepperers, spicers and apothecaries, and later grocers or those who sold *"en gros."* The grocers in the 15th century in England were given authority over drugs and spices and had the supervision of the quality of the drugs and medicines sold by the apothecaries. A record of the exercise of this authority is found in the case of the imposition of a fine by the Grocers' Guild upon one John Ashfield, an apothecary, for making an untrue powder of ginger, cinnamon and saunders. This close association between the grocers and apothecaries is further illustrated by a record during Queen Elizabeth's time, of the apothecaries and grocers being required to expose the ingredients from which their medicines were prepared, to view in their shops for a stated period, in order that physicians might inspect them and approve of their quality.

The separation of the grocers from the apothecaries in Great Britain by royal edict in 1617 is a matter of history, and it is a matter of history also that the apothecaries' guild was one of the few English guilds which remained true to its name and admitted to its membership only actual apothecaries. The apothecaries of England, however, after being freed from the supervising authority of the grocers, became quite powerful and soon encroached upon the rights and privileges of the physicians in diagnosing and prescribing. The year 1687 saw the beginning of a great contest between the physicians and apothecaries, which was not settled until 1703, when by judicial decision the apothecaries were given the right to treat minor ailments.

Internal dissensions in the Guild later subdivided it into the apothecaries proper, who retained all of the rights of prescribing under certain circumstances and into chemists and druggists, who did not share this privilege. A somewhat similar subdivision into classes seems to have persisted in Germany and some other European countries, where the one class is permitted to compound and dispense drugs and medicines and poisons of all kinds, while the other is restricted to the sale of a limited class of articles.

The foregoing material is by no means new or original but has been prepared with the aid of several of the available works upon the history of pharmacy, particularly the recently published Chronicles of Pharmacy by A. C. Wootton. The excuse for the presentation of this article is that few pharmacists have more than a hazy idea of the history of their ancient and honorable profession. The books with which they are familiar do not treat of the subject, the works which do are not very numerous and it is only through occasional articles found in the pharmaceutical journals that the pharmacist knows his profession has a history at all.

Inasmuch as many of the problems of pharmacy to-day are hundreds and some of them thousands of years old and have been solved at various periods in its history with a greater or lesser degree of success, and for the reason that a closer study of this history may throw additional light upon our present day problems and perhaps aid in their solution, the foregoing facts are presented, not only because they are interesting in themselves, but because by stimulating interest in the subject they may aid in the development of the profession along the lines of the ideals held out by such worthy members as Galen, Dioscorides, Lully, Valentine, Paracelsus, Van Helmont, Glauber, Goulard, Scheele and many others not so well known, but of equal prominence in their time.

DETECTION AND QUANTITATIVE ESTIMATION OF MINUTE QUANTITIES OF FORMALDEHYDE IN PRESENCE OF HEXAMETHYLENAMINE AND METHYL ALCOHOL IN PRESENCE OF ETHYL ALCOHOL.[1]

By H. A. B. Dunning.

Sometime during the year 1912, Dr. Curtis F. Burnam, member of the staff of Johns Hopkins Hospital, sought my advice as to the most satisfactory method of detecting traces of formaldehyde in urine.

After a careful investigation, I recommended, as most delicate and satisfactory, three tests herein named and described.

Only one of these tests, Rimini's, was of particular value in his work on account of the presence of hexamethylenamine in material tested. Helner's milk test, while most delicate, was not suitable on account of being conducted in acid solution, resulting in decomposition of hexamethylenamine with the production of formaldehyde.

While Rimini's test has been found to be most satisfactory in differentiation of formaldehyde in presence of hexamethylenamine. experience teaches that certain precautions should be observed to obtain best results.

The specimens to be examined and all test solutions should be warm, not hot, and an excess of nitroprusside solution should be avoided. In weak specimens the nitroprusside solution should be diluted five to ten times. In urine formaldehyde may be detected readily by this test in strength of 1-100,000; in weaker strengths than this, much depends upon the care and experience of the operator.

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[1] Read at the Nashville meeting of the American Pharmaceutical Association, August, 1913.

The test is usually conducted as follows: About 2 c.c. of urine specimen, contained in five-inch test tube, is warmed and two drops of one-half per cent. solution of phenylhydrazine hydrochloride is added, followed by two drops of one-half per cent. solution of sodium nitroprusside, the mixture being made strongly alkaline with saturated solution of sodium hydroxide. In strengths 1-20,000 to 1-50,000, a deep blue coloration results, changing in a few minutes to green, then yellow, or perhaps, red. In more dilute solutions the blue lasts momentarily only, and is quickly superseded by green. The blue may be made to last longer and become more distinct by adjustment of the quantities of sodium nitroprusside and phenylhydrazine hydrochloride added, the weaker strengths requiring less nitroprusside and phenylhydrazine. In alkaline solutions phenylhydrazine gives yellow color, therefore, if there is but a trace of formaldehyde, the depth of blue color is masked and converted into green by mixtures of colors blue and yellow.

Phloroglucin test, the author of which I have lost record, is quite satisfactory for dilutions of formaldehyde in urine, not exceeding 1-100,000, the red color being masked by yellow of the urine. The author of this test directs that a solution of phloroglucin, 1 gram, alcohol 90 per cent. 100 c.c. and sodium hydroxide 10 grams, be made fresh. A much better plan is to prepare a solution of phloroglucin in alcohol, 1 gram to 100 c.c., and add strong solution of sodium hydroxide to specimen at time of testing.

The test is conducted as follows: To 2 c.c. of specimen, previously warmed, contained in a five-inch test tube, add one drop of alcoholic solution of phloroglucin, then make strongly alkaline with saturated solution of sodium hydroxide, previously warmed, the color produced is red.

These tests have been used with satisfaction in connection with an investigation made by Dr. Burnam and his associates. It seems to me desirable, in connection with this paper, to call attention to the character of Dr. Burnam's work and the importance of the conclusion arrived at. In a few words, Dr. Burnam has learned that small doses, as little as five grains per day of hexamethylenamine may produce formaldehyde in the urine of strength exceeding 1-30,000, this being highly destructive to the mucosa of the bladder, while in other patients or, perhaps, at different times, one hundred grains per day will produce only traces of formaldehyde, or perhaps, none at all. The point of interest is that it is dangerous to give large doses of hexamethylenamine until the patient has first been treated with small doses.

Subsequent to the publication of Dr. Burnam's paper, much interest was evinced by the medical fraternity in the discovery of a test for the quantitative estimation of formaldehyde in the urine that would differentiate hexamethylenamine and yet would be practicable in the hands of the physician.

I offer the following test to fill this requirement; from an assayed specimen of commercial formaldehyde solution, accurate dilutions are prepared of strengths 1-50,000, 1-100,000, 1-200,000, 1-300,000, as standard solutions for colorimetric comparison. More standard solutions may be prepared if necessary. The test will estimate quantitatively up to 1-500,000 in the urine and 1-30,000,000 in clear water. Dextrose, acetone, acetaldehyde do not interfere in solutions weaker than 1-30,000 and then only on heating or long standing.

The test is conducted as follows: To five c.c. of specimen contained in five-inch test tube, add .1 c.c. of 15 per cent. solution of sodium hydroxide and mix well. Then add .1 c.c. phenylhydrazine, base, not hydrochloride, finally add .7 grams of stick sodium hydroxide and agitate for ten minutes. The strength is estimated colorimetrically by comparing with the standard solutions treated in same manner as specimen, and at the same time. It is important to remember that the several reagents must be added to specimen and standard solutions at the same time; *i.e.*, specimen and standard are treated simultaneously.

Colorimetric comparisons must be made within twenty minutes after stick alkali is added. Usually comparisons are made in about ten minutes subsequent to the addition of stick alkali.

If it is desired to keep specimens for some hours previous to estimation, then the .1 c.c. of 15 per cent. solution of sodium hydroxide must be added. This addition prevents decomposition of hexamethylenamine with production of formaldehyde, which will take place in acid urine on standing. After specimen has been made alkaline as directed in method of assay, no attempt should be made to remove precipitate, as such procedure will remove free formaldehyde wholly or in part. In my experience any attempt to remove color of urine, by charcoal, precipitation, reduction, oxidation, etc., results in removal of some or all of free formaldehyde.

This test has been used with much satisfaction in a series of clinical experiments conducted at Union Protestant Infirmary by Dr. George Walker, Associate Professor of Surgery, Johns Hopkins Hospital.

In line with the above work is a recent examination of samples of whiskey submitted by Dr. Hiram Woods, Eye Specialist, of this city. Dr. Woods stated that he was at that time treating a patient almost blind, who could offer no explanation of his condition, except that he had partaken rather freely of whiskey mislabelled Sherwood Maryland Rye.

Upon investigating a sample of this brand of whiskey, it was found to be a mixture of approximately 30 per cent. methyl alcohol, about 15 per cent. grain alcohol and 55 per cent. water. This sample was tested among other tests, including specific gravity of distillates, as follows:

A test tube partially filled with sample of whiskey was heated until vapor formed in upper part of tube, into which a copper spiral heated to redness and slightly cooled in air was plunged. The characteristic odor of formaldehyde and the effect on nasal passages was observed, masked to some extent by acetaldehyde and other odors. The formaldehyde odor was much more characteristic when applied to a fraction of distillate partially freed from water by saturating with potassium citrate and distilling supernatant layer.

The specimen was further tested as follows: 100 c.c. was supersaturated with potassium citrate and thoroughly shaken. When two strata of liquid were formed, the upper measured about 44 c.c. This latter liquid was removed into a distilling bulb connected with a distillation tube having several bulbs and carrying glass beads. The liquid was heated on water bath and began to boil at 68°–70° C., the larger portion distilling over under 75° C., rising to 78° then to 85°. The mixed distillate was twice distilled over lime, practically all coming over under 78° C. This distillate was then carefully fractionated, the lower boiling point fractions being collected and refractionated until 19 c.c. of liquid boiling at 65°–66° C. was obtained. This distillate tested with copper spiral gave entirely characteristic formaldehyde effects.

Formaldehyde produced in solution by plunging heated copper spiral into portion of distillate and testing in accordance with Rimini's Test, gave entirely characteristic reaction, as also Hehner's milk test, Phloroglucin test, and Dunning's test.

Methyl salicylate was produced with salicylic acid and sulphuric acid, but only a trace of iodoform could be produced. The quantity of methyl alcohol, 96 per cent., was then estimated with a refractometer and by the method suggested by C. Simmonds in his notes on the determination of small quantities of methyl alcohol, which is here given.

NOTE ON THE DETERMINATION OF SMALL QUANTITIES OF METHYL ALCOHOL.

BY C. SIMMONDS: Analyst. 27, 16 (1912).

Small proportions of methyl alcohol have hitherto been somewhat difficult to determine readily and accurately. Fairly good approximate results can be obtained by comparative experiments with the well known method of Riche and Bardy (Compt. rend., 80, 1076, 1875), or with Wolff's modification of Trillat's process (Ann. Inst. Pasteu, 1902, 8), but these methods are lengthy and rather troublesome. The process described by Thorpe and Holmes (J. Chem. Soc., 85, 1; 1904) gives good results when the quantity of methyl alcohol is not too small. It is not well adapted, however, for use when the proportion of methyl alcohol is less than about 2 per cent. of the ethyl alcohol, since the necessary subtractive correction (loc. cit., pp. 2, 3) may in such cases be equal to or may exceed the quantity it is desired to estimate. For determining very small portions of methyl alcohol the method is quite inapplicable. In such cases satisfactory determinations can be made by applying the principle of colorimetric comparison by Deniges' process for detection of methyl alcohol (Compt. rend., 150, 332, 1910).

The possibility of thus using the process is indicated by Deniges' (loc. cit., p. 833). The object of the present note is to give the procedure which the writer finds most suitable for utilizing the reaction quantitatively in general analytical work as, for example, in examining spirituous beverages, medical tinctures, flavoring essences, and so forth.

The alcoholic mixture is best purified, when necessary, either by the method of Thorpe and Holmes (J. Chem. Soc., 83, 314, 1903), or by other suitable means. It is then diluted with water or mixed with ethyl alcohol, as the case may require, until it contains 10 per cent. of total alcohol by volume.

To 5 c.c. of this prepared liquid contained in a wide test tube are added 2.5 c.c. of permanganate solution (2.0 grams $KMnO_4$ per 100 c.c.), and then 0.2 c.c. of strong sulphuric acid. When the reaction has proceeded about five minutes, 0.5 c.c. of oxalic acid solution is added (0.6 grams crystallized acid per 100 c.c.). On shaking the liquid becomes clear and nearly colorless. One c.c. of strong sulphuric acid is now run in and well mixed with the solution, which is finally treated with 5 c.c. of Schiff's reagent. A violet color is developed in the course of a few minutes unless mere traces of methyl alcohol were present, when twenty or thirty minutes may be required.

This color is due, of course, to the reaction of the fuchsin solution with formaldehyde, produced by the oxidation of the methyl alcohol. A sufficient quantity of sulphuric acid is present to prevent the development of color with any acetaldehyde formed from the ethyl alcohol during the oxidation.

A preliminary experiment carried out as described serves to detect the presence of methyl alcohol, if it is not already known, and to give some idea of the quantity. According to the indications thus obtained, another part of the prepared liquid is further diluted, if necessary, with ethyl alcohol of 10 per cent. strength until it contains from 0.001 to 0.004 grams of methyl alcohol in 5 c.c.; the experiment is repeated side by side with two or more standards for comparison. These contain 0.001, 0.002, 0.003, etc., gram of methyl alcohol in 5 c.c. of 10 per cent. ethyl alcohol. The colors produced are compared in small Nessler tubes (25 c.c.) or in a suitable colorimeter.

With properly sensitive Schiff's reagent, 0.0003 gram methyl alcohol in the 5 c.c. of liquid taken is readily detected. The best depths of color for comparison, however, are given by the formaldehyde produced in the manner described from quantities of 0.001 to 0.004 gram of methyl alcohol.

It is convenient to keep a standard solution (1 gram per liter) of methyl alcohol in 10 per cent. ethyl alcohol. This is diluted as required with 10 per cent. alcohol to form the standards for comparison. This proportion of ethyl alcohol (10 per cent.) is a suitable strength for general work, as the distillates ordinarily obtained are stronger, and can be diluted down instead of having to be concentrated.

The process has the advantage of (1) being rapidly executed, (2) requiring only a small quantity of material, and (3) being directed applicable to weak distillates. The degree of accuracy obtainable is shown by the following results of a typical series of experiments:

Grams methyl alcohol per 100 c.c.							
Present	0.005	0.028	0.044	0.072	0.100	0.500	1.000
Found	0.004	0.029	0.046	0.072	0.104	0.492	0.968

Formaldehyde, of course, must be absent from the unoxidized solution of the alcohols, or else its effect must be determined and allowed for. Glycerol must also be absent.

The method of purification referred to is for the purpose of getting rid of other volatile substances, such as ether, chloroform, benzene, essential oils, etc.; 25 c.c. of the sample are diluted in a separatory funnel with water to 100–150 c.c.; enough salt added to saturate the solution which is then shaken vigorously for five minutes with 50–80 c.c. of light petroleum (boiling below 60°), allowed to stand 0.5 hour, the lower layer drawn off and again extracted if necessary, the petroleum extracts washed with 25 c.c. of saturated salt solution, the wash waters added to the main bulk of liquid which is then neutralized if necessary and 100 c.c. distilled over. Experiment has shown that all of the alcohol is recovered in the first 100 c.c. of distillate.

Note by author of this paper. Sensitive fuchsin bisulphite solution is readily made according to the following formula: In 100 c.c. of a saturated solution, less than 1 per cent. of basic fuchsin, dissolve sodium bisulphite 10 grams and when nearly colorless mix with purified animal charcoal and filter, a perfectly clear colorless solution should result.

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Baltimore, Md.

PROGRESS IN PHARMACY.

A QUARTERLY REVIEW OF SOME OF THE MORE INTERESTING LITERATURE RELATING TO PHARMACY AND MATERIA MEDICA.

By M. I. WILBERT, Washington, D. C.

The Pharmaceutical events of the year, the meetings of the American Pharmaceutical Association and of the National Association of Retail Druggists, have passed into history but will long be remembered as being epoch-making in that the associations have undertaken to develop activities heretofore generally ignored.

The American Pharmaceutical Association at its meeting in the City of Nashville during the week of August 18th established a commission to study and to report on the uses and limitations of proprietary remedies.

The National Association of Retail Druggists at its meeting in the City of Cincinnati the following week devoted considerable time to the discussion of the proposed Federal antinarcotic legislation, and while in a general way, the Association endorsed the work of the National Drug Trade Conference, a number of exceptions to the so-called Harrison Bill, H. R. 6282, now pending in Congress, were taken, and the Committee on National legislation was instructed to bring these exceptions to the attention of persons interested.

Many of the State Pharmaceutical Associations have already held their annual sessions and from the published reports in drug and other journals the meetings this year have been more than usually successful. Several of the state associations report material accessions to their membership and at all of the meetings this year the interest in organization work appears to have been well maintained.

Drug Plant Exhibition.—The annual meeting of the American Medical Association was referred to at some length in a previous number of this JOURNAL (August, p. 380) but the account failed to call attention to the unusually interesting exhibits of a scientific nature. From a pharmaceutical point of view the collection of drugs, growing as well as dried, made by the Department of Pharmacy of the University of Minnesota was of greatest interest. It was particularly unfortunate that this really excellent collection of material was not shown in connection with other exhibits in the main building so as to have been available for study by a greater number of visiting members of the A. M. A.

The Association of Food, Dairy and Drug Officials held its annual meeting at Mobile, Alabama, June 16 to 20, 1913. To the pharmacists of the country the annual meetings of this Association should be of immediate interest though the proceedings are but seldom reported in drug journals and very infrequently indeed commented on by pharmacists themselves. From a report of the proceedings for this year (The American Food Journal, July, 1913), it appears that a propaganda for education and co-operation is to be instituted in connection with the enforcement of Federal and State Food and Drug Laws and that the individualism so frequently manifested heretofore will give way to concerted action on the part of all concerned.

A discussion on the substandard clause of the National and many of the State laws relating to drugs elicited general condemnaton of this provision and the suggestion that all drugs should be required to conform with adopted standards.

The British Pharmaceutical Conference held its 50th Annual Meeting in London the week of July 21, 1913, and from the reports published in British pharmaceutical journals, the meeting was from all points of view most successful. The papers read in the two sections were of the usual high quality and constitute a valuable contribution to pharmaceutical literature. Some of the foreign guests to the Jubilee Meeting contributed to the scientific section of the conference and all took an active part in the discussion of the several papers that were presented. . . . P.-van der Wielen, the representative of the Pharmaceutical Society of Holland, presented a paper on standardization of opium for pharmaceutical purposes in which he recommends the adoption of a normal opium standardized for morphine, narcotine, codeine and meconic acid.

Pharmacopœia Revision, British.—Umney, John C. (*Pharm. J.*, 1913, v. 91, pp. 162-172), in the presidential address before the British Pharmaceutical Conference, presented a comprehensive review of conditions under which national pharmacopœias are produced in other countries and a comparison of these conditions with the methods which prevail in Great Britain. Also made a plea for the statutory recognition of pharmacists as co-revisors with medical men in the production of the British Pharmacopœia.

The report of the Pharmacopœia Committee of the General Medical Council states in part: (*Chem. & Drug.*, 1912, v. 82, p. 884): Six sections of the draft text of the new Pharmacopœia have now been prepared by the editors, and are undergoing revision by the committee, with the help of the several Committees of Reference. The greater part of the work is ready to go to press. A further report by the Committee of Reference in Pharmacy, containing suggestions relating to the formulæ for official ointments, has been received, and will be published shortly.

International Pharmaceutical Congress.—Anon. (*Pharm. J.*, 1913, v. 90, p. 831). More than 500 applications for membership have already been received for the 11th International Pharmaceutical Congress to be held at The Hague from September 21 to September 27. The proceedings promise to be interesting, both from the social and business points of view.

The preliminary program for the Congress enumerates a large number of important subjects for discussion in the five sections into which the Congress is to be divided. The meetings are to be held under the august patronage of His Royal Highness, Prince Henry of the Netherlands, and pharmacists who are interested may register as patrons (25 florins) or as ordinary members (10 florins) by sending the required amount to the Secretary, J. J. Hofman, Schenkweg 4, The Hague, Holland.

Hygienic Laboratory Bulletin No. 88, recently published, outlines a method for determining *the toxicity of coal-tar disinfectants* together with a report on the relative toxicity of some commercial disinfectants. The author, Worth Hale, expresses the opinion that from a physiological point of view it follows that if a substance when introduced into the body, and acting chemically, injures or interferes in any degree with the normal physiological processes it should be classed as a harmful agent and hence a poison. All poisonous substances should be classified according to the degree of their toxic action and power to cause either late or immediate death. The Bulletin reports a systematic study of 80 disinfectants 23 of which were labelled, either directly or by inference, as being free from poisonous properties. All of the preparations were found to be poisonous to guinea pigs, cats and mice, though the degree of relative toxicity varied from 5 to 90 per cent. of that of phenol.

Council on Pharmacy and Chemistry.—Sollmann, Torald. (*J. Am. Med. Assoc.*, 1913, v. 61, p. 5-7). Yesterday, to-day and tomorrow, a review of the activities of the Council on Pharmacy and Chemistry. The publication of New and Nonofficial Remedies and the production of an authoritative compend of therapeutically active drugs.

Local Formularies.—Anon. (*Pharm. J.*, 1913, v. 90, p. 863). A number of local organizations in different parts of Great Britain have issued local formularies based upon the B. P. Codex to cover the preparations largely prescribed in the particular locality.

Patent Medicines.—Anon. (*Chem. & Drug.*, 1913, v. 82, pp. 943-944). Members of the Select Committee of Parliament on patent medicines are credited with having conducted the patent medicine inquiry with great thoroughness. One thing which appears tolerably certain is that the Committee will recommend the prohibition of advertisements of "cures" for cancer and consumption. They will also advocate a much stricter control over the sale of remedies for female ailments and the total suppression of the public supply of abortefacients.

Patent Medicine Revenue.—Anon. (*Chem. & Drug.*, 1913, v. 83, p. 45). The Chancellor of the Exchequer is quoted as stating that the amount of the loss in the estimated revenue from patent medicines this year, compared with the actual revenue last year, is about £50,000.

Hypnotic Drugs Classed as Poisons.—Anon. (*Pharm. J.*, 1913, v. 90, p. 772). Various hypnotic drugs are now included in part 2 of the British Schedule of Poisons. The words actually added to the Schedule are as follows: "Diethyl-barbituric acid and other alkyl, aryl, or metallic derivatives of barbituric acid, whether described as Veronal, Proponal, Medinal, or by any other trade name, mark, or designation; and all poisonous Urethanes or Ureides."

Veronal as a Poison.—Bennett, Ernest H. G. (*Chem. & Drug.*, 1913, v. 83, p. 66). Veronal promises to be a fashionable poison for would be suicides. Recently observed cases suggest the desirability of transferring this substance from part 2 of the poison schedule to part 1 and thus render it more difficult to purchase except with a prescription.

Improper Containers.—Murray, B. L. (*J. Am. Pharm. Assoc.*, 1913, v. 2, p. 446). Many chemicals deteriorate rapidly for lack of proper containers, and greater care should be exercised in insisting that chemicals, particularly chemicals for pharmaceutical and analytical purposes, be properly packed.

The Interpretation of U. S. P. Assay Processes.—Taylor, Frank O. (*J. Ind. & Eng. Chem.*, 1913, v. 5, pp. 601–604). Conditions surrounding the assay of drugs and preparations, by different men, cannot always be the same and variation may occur for a number of reasons. The carrying out of the assay processes of the U. S. P. must be done with a clear vision of the end to be attained and a thorough understanding of the many pitfalls in the way of the chemist.

Glass Stoppers, Loosening.—Steensma, F. A. (*Chem. Weekblad*, 1912, v. 9, pp. 894–896). When the usual methods of loosening glass stoppers do not avail, a small quantity of ether poured on the neck of the bottle so that the ether may penetrate as much as possible between the stopper and the neck, then warming the outer side of the neck with warm water, will frequently loosen the stopper.

Diuretic Drugs.—Christian, Henry A. (*J. Am. Med. Assoc.*, 1913, v. 61, p. 267), reports some experimental work to determine the value of diuretic drugs in acute experimental nephritis. The results, while too limited to be conclusive, are suggestive and indicate the need of careful reexamination of the effects of various diuretics in nephritis with the methods now available for testing renal function.

Nitrogen, Determination of.—Rosenbloom, Jacob. (*J. Am. Med. Assoc.*, 1913, v. 61, pp. 87-88). A method for the estimation of total nitrogen and ammonia nitrogen in urine. The method depends on the fact that when a neutral solution of an ammonium salt is treated with formaldehyde, combination occurs with the formation of hexamethylenetetramine and the liberation of a corresponding amount of acid which can be titrated with tenth-normal sodium hydroxide.

Ash and Moisture Constants of Powdered Vegetable Drugs.—Thurston and Thurston. (*J. Am. Pharm. Assoc.*, 1913, v. 2, pp. 474-476). A report in the form of a table giving the water content, ash content, and the nature of the ash found in a number of the official and unofficial drugs.

The Valuation of Chocolate.—Kühl, Hugo. (*Suedd. Apoth. Ztg.*, 1913, v. 53, pp. 214-216). For the chemical determination of adulterations in chocolate it is necessary to determine the ash content, the fat content, the nature of the fat and the sugar content. Corn starch can be recognized by means of the microscope, as can powdered cacao nibs.

Salicylic Acid.—Hewlett, A. W. (*J. Am. Med. Assoc.*, 1913, v. 61, pp. 319-321), reports on the clinical effects of "natural" and "synthetic" sodium salicylate. The variations in action shown by the tabulated statistics of the comprehensive report are surprisingly small. Allowing for statistical error, one must conclude that natural and synthetic sodium salicylate are indistinguishable so far as their therapeutic and toxic effects on patients are concerned.

Methyl Alcohol.—Editorial. (*J. Am. M. Assoc.*, 1913, v. 61,

p. 126). The close chemical relationship and the similarity in physical properties and behavior of methyl and ethyl alcohol have made it difficult to believe that they could be so distinct and unlike in respect to their toxicity. A growing collection of evidence is making it manifest, however, that in small, frequently repeated doses methyl alcohol is far more poisonous than is ethyl alcohol. A single large dose of the latter may, however, provoke a more toxic manifestation than does methyl alcohol. It would appear as if methyl alcohol, administered in small repeated quantities, brings about a cumulative effect.

Antiluetin.—Anon. (*Suedd. Apoth. Ztg.*, 1913, v. 53, p. 440). Antiluetin, the bitartrate of potassium-ammonium-antimony oxide, is being introduced as a substitute for salvarsan, it being thought that the use of the less poisonous antimony in place of arsenic in organic combination might be of advantage. It has been extensively experimented with in the hospitals of Japan.

Aqua Destillata.—König, F. (*Apoth. Ztg.*, 1913, v. 28, p. 383). It has been repeatedly shown that sterilized distilled water, even within several days, contains bacterial vegetation and that such germ-laden water is not safe for use in connection with solutions that are to be introduced intravenously as the solutions, even after sterilization, will of necessity contain killed organisms and the chemical products generated by them.

Argulan is mercuric dimethyl-phenyl-pyrazolone containing 46.8 per cent. Hg, and is reported to be a very useful antisyphilitic (*Chem. & Drug.*, 1913, v. 82, p. 945).

Asafœtida.—Greenish, Henry G. (*Pharm. J.*, 1913, v. 90, pp. 729-731). Asafœtida is exported chiefly from the Persian Gulf ports, and from Bombay. That which reaches London comes almost entirely from the Persian Gulf, though small quantities may be transshipped to London at Hamburg. Much of that sold on the London market is reexported to the United States, Canada, South Africa, and the Continent. Comparatively little of the drug is in fine tears with a uniform waxy fracture.

Bromides.—Greene, Charles W. (*J. Am. Med. Assoc.*, 1913, v. 61, pp. 271–273), reports a study to determine the responses of the heart to bromide perfusion. The inorganic bromides are relatively indifferent to such organs as the heart of the cold-blooded vertebrates. On the hearts of warm-blooded animals the bromides are in the long run sharply depressant. From a review of the literature the authors conclude that many of the so-called bromide therapeutic effects are distinctly chargeable to the base with which the bromide has been combined.

Calcium Chloride.—Anon. (*Suedd. Apoth. Ztg.*, 1913, v. 53, p. 261). Attention is called to the greatly increasing use of calcium chloride bread for the administration of calcium chloride.

Cannabis Indica.—Anon. (*Suedd, Apoth. Ztg.*, 1913, v. 53, p. 423). The Egyptian Government has prohibited the importation of cannabis indica and is taking active steps to prevent smuggling of this narcotic.

Coca.—Anon. (*Suedd, Apoth. Ztg.*, 1913, v. 53, p. 367). Peru has long since lost its claim as the home of erythroxylon coca. The plant is being cultivated in many of the other South American countries, Bolivia, Ecuador, Columbia, and also Brazil. It is also produced in quantities in the West Indies, Java, and Ceylon. According to recent reports the Java planters are to undertake the manufacture of crude cocaine.

Colocynth.—Roe, R. B. (*Pharm. J.*, 1913, v. 90, p. 800 [Lancet, May 31, 1913]), reports a case of poisoning by colocynth in which a woman of 25 years took 75 grains of powdered colocynth. Vomiting and diarrhœa were the principal symptoms during the acute period. This drug appears to be uncertain in its action, the smallest fatal dose for a human being on record is 60 grains, but recovery is recorded to have taken place after 3 ounces.

Diplosal.—Council on Pharmacy and Chemistry of the A. M. A. (*J. Am. Med. Assoc.*, 1913, v. 61, p. 121). Diplosal is the salicylic ester of salicylic acid. It is obtained from salicylic acid or salicylates by the action of suitable condensing agents. Diplosal occurs as a white, crystalline powder, practically free from odor and taste. It melts at 147-148° C. It is almost insoluble in water, but is easily soluble in ether and benzene. It is soluble in alkaline solutions, with formation of alkali salicylate. Diplosal may be given in single doses of 0.5 to 1 gm.

Diplosal, Toxicity of.—MacLachlan, John. (*J. Am. Med. Assoc.*, 1913, v. 61, pp. 116-117), reports on the toxicity of diplosal. The author concludes that diplosal is, like all of the salicylates, toxic, if given in large doses; and that it does require much smaller doses to produce the toxic effect.

Emetine Hydrochloride.—Council on Pharmacy and Chemistry of the A. M. A. (*J. Am. Med. Assoc.*, 1913, v. 61, p. 27), emetine hydrochloride, the hydrochloride of an alkaloid found in *Cephaelis ipecacuanha,* occurs as a white, crystalline powder, soluble in water and alcohol. The aqueous solution of emetine hydrochloride is practically neutral toward litmus. The general alkaloidal reagents precipitate emetine, even from dilute solutions. Alkalies precipitate it from aqueous solutions of its salts. Emetine is said to act similarly to ipecac, but is relatively more nauseant and less emetic.

Ergot.—Crawford and Crawford. (*J. Am. Med. Assoc.,* 1913, v. 61, pp. 19-23). The cock's comb test for the activity of ergot preparations, with report of a number of experiments made with hydroxyphenylethylamin.

Glycyrrhiza.—Anon. (*Chem. & Drug.,* 1913, v. 82, pp. 773-774). The collection of licorice root in Turkey and Russia has been developed into a flourishing industry by an Anglo-American concern. A considerable proportion of the licorice gathered is used for flavoring tobacco in the United States. In Syria the licorice plant, *Glycyrrhiza glabra,* is not cultivated, but is found growing wild in large quantities, usually in stretches of open land where the soil is of a damp and marshy character. It is regarded by the natives as a serious pest, greatly interfering with cereal cultivation.

Hedeoma.—Macht, David I. (*J. Am. Med. Assoc.,* 1913, v. 61, pp. 105-107). A case of poisoning by oil of pennyroyal; with report of some experimental observations, from which the author concludes that the so-called emmenagogue oils are by no means innocuous substances, and do not deserve the place among the official pharmacologic preparations which many of them hold.

Hydrastis.—Anon. (*Suedd. Apoth. Ztg.,* 1913, v. 53, p. 240). Fluid extract of hydrastis precipitates readily and the precipitate usually carries down with it some of the contained alkaloids.

Hygralon is the name given to a mercury-potash soap prepared from cocoanut oil with 30 per cent. metallic mercury, which is said to be an efficient substitute for blue ointment as an antisyphilitic inunction (*Chem. & Drug.,* 1913, v. 28, p. 945.)

Lactopeptine.—Puckner, W. A. (*J. Am. Med. Assoc.,* 1913, v. 61, pp. 358-359). A report on the re-examination of lactopeptine, which confirms the findings of the Council on Pharmacy and Chemistry published some six years ago.

Magnesium Sulphate.—Anon. (*Pharm. J.,* 1913, v. 90, p. 719). A case of death by poisoning from Epsom salts is reported.

It is thought that the patient, a woman, had taken over 4 ounces of the drug at one dose.

Nitroglycerin.—Cornwall, Edward E. (*J. Am. Med. Assoc.*, 1913, v. 61, pp. 118-120). Nitroglycerin should never be used for the primary purpose of a heart stimulant. When given under the tongue it produces almost as prompt an effect as when injected under the skin. The chief contra-indications to the use of nitroglycerin are (1) low or relatively low blood pressure; (2) advanced chronic nephritis with very high blood pressure and toxemic conditions producing high blood pressure, as a rule; and (3) the presence of an idiosyncrasy in regard to its action.

Nux Vomica.—Hjelt, W. (*Apoth. Ztg.*, 1913, v. 28, p. 415 [*Farmaceutiskt Notisblad*, 1913, No. 10]). Nux vomica extracted with menstrua containing from 20 to 70 per cent. of alcohol was found to yield tinctures that contained essentially the same amount of alkaloids though the extract content in the tinctures made with low percentage alcohol was much higher than that of the tinctures made with stronger alcohol.

Opium.—Anon. (*Chem. & Drug.*, 1913, v. 83, p. 56). The Chinese Government has requested that the opium accumulated at Chinese ports be reshipped to non-Chinese markets and has offered to pay the freight. No final decision has as yet been come to by the British Government.

Opium, Production of.—Anon. (*Suedd. Apoth. Ztg.*, 1913, v. 53, pp. 263-264). An article by R. Millant on the production of opium in Turkey states that there are at the present time 3 markets for this opium, Smyrna, Constantinople and Salonica, that receive their opium from the adjoining country.

Phenolsulphonephthaelin.—Goodwin, Charles. (*J. Am. Med. Asoc.*, 1913, v. 61, pp. 184-189). The use of phenolsulphonephthalein in estimating the functional activity of the kidneys. The intravenous injection of the substance is not as satisfactory as when it is given by mouth. It frequently gives information that is of considerable value.

Potassium Permanganate, as an Anæthetic.—Barton, Wilfred M. (*J. Am. Med. Assoc.*, 1913, v. 61, pp. 196-197). A preliminary communication in regard to potassium permanganate as a local anesthetic to the genito-urinary mucous membranes; with a report of several cases. It has no perceptible action on the skin.

Salvarsan.—Wadhams, S. H. (*J. Am. Med. Assoc.*, 1913, v.

61, pp. 385-386). A report of three cases of amebic dysentery successfully treated with salvarsan.

Santonica.—Anon. (*Chem. & Drug.*, 1913, v. 82, p. 950). Genuine worm seed (*Artemisia maritima*) only occurs in Russian Turkestan, in the region bounded on the east by the mountain chain of the Kara-Tau, and on the west by the river Syr Darja. Up to 15 years ago the Kirghiz collected the seed and sold it where they could obtain the best prices. In recent years the Russian Government has divided the region into 5 districts, and leased the right of collection for 1 year to the highest bidder in public auction.

Santonin-free Santonica.—Enz, K. (*Apoth. Ztg.*, 1913, v. 28, pp. 514–515), describes the santonin-free santonica now appearing on the European market.

LaWall, Charles H. (*J. Am. Pharm. Assoc.*, 1913, v. 2, pp. 596-597). A drug corresponding closely in appearance with the official santonica was found to contain not more than a trace of santonin.

Strophanthinic Acid.—Sieberg, E. (*Ber. Pharm. Gesellsch.*, 1913, v. 23, pp. 278-290). Strophanthinic acid has been isolated from the three best known varieties of strophanthus. The substance occurs as a white, amorphous mass that in solution reddens litmus paper and in aqueous suspension combines with alkalies and alkali carbonates with liberation of carbon dioxide. It may be titrated with alkalies by the use of phenolphthalein as an indicator. The probable formula of strophanthinic acid is $(C_{21}H_{34}O_{10})_4$.

Turpentine.—Blackwood, J. Douglas. (*J. Am. Med. Assoc.*, 1913 ,v. 61, pp. 412-413), reports a case of turpentine poisoning with a scarlatinoid rash, in addition to the ordinary symptoms of turpentine poisoning.

THE 1913 MEETING OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.

The 61st Annual Convention of the American Pharmaceutical Association was held in the city of Nashville, August 18–23, 1913, and the members of the Association who had the privilege of taking part in the proceedings will long remember the warm welcome, the kindly hospitality and the consistent efforts to please that were manifested on the part of Nashville druggists and their friends.

While the Nashville meeting will not be recorded as record-breaking so far as attendance is concerned, the total registration aggregrated 397 and practically all sections of the country were represented. Despite the unusually hot weather which prevailed during the week, the attendance at the several sessions of the Association and of the different sections was unusually good. The meeting rooms were large and roomy and everything that the members of the local committee could do to make the stay of members of the A. Ph. A. comfortable and pleasant was done. The opening sessions of the Associations and many of the subsequent meetings of the several sections were held in the rooms of the Masonic Grand Lodge building, within a few minutes walk of the Hotel Hermitage, the official headquarters. The sessions of the Council, meetings of special committees and some of the section sessions were held in the hotel itself.

The first session of the Association was formally opened by President W. B. Day, on the afternoon of August 18th. In the absence of the Governor of Tennessee, his Secretary, Robert S. Henry, welcomed the members and delegates to Nashville. R. W. Vickers, of Murfreesboro, Tennessee, extended a welcome on behalf of the pharmacists of that State and these several addresses were replied to by Joseph P. Remington in his usual happy vein.

The address of the President contained a number of recommendations of policy and discussed at some length the relations of pharmacy to the manufacture and use of nostrums and the abuse of habit-forming drugs. In commenting on the attitude of pharmacists toward the so-called "patent" medicines, he said in part: "These proprietaries are secret in composition and secrecy in formula is frequently acompanied by extravagant exploitation. In some cases the patient is injured by the formation of drug habits, in others by the excessive or ill-advised use of potent drugs, while if no other ill effects are experienced, there is often a waste of valuable time devoted to 'trying out' a much vaunted cure, during which the opportunity for successfully combating the disease is lost. . . . At best the pharmacist has no opportunity to show his skill but merely hands out a package of ready made medicine of whose composition he knows little or nothing and perhaps assumes the responsibility for recommending it in the treatment of disease of whose nature he is equally ignorant.

"At this time we should do no less than emphatically restate our steadfast opposition to nostrums of all descriptions. This Association has constantly opposed quackery and fraud in medicine and should pledge its cordial support to the efforts which the American Medical Association is making to overcome these twin evils."

At the second session the Association authorized the appointment of a council or commission on proprietary medicines to consist of five members whose duties it will be to investigate and report on various proprietary medicines sold in the United States and their percentage of alcohol and of habit-forming drugs.

The members of this council, as announced at the final meeting of the Association, are Thos. F. Main, of New York, to serve for one year, Jas. H. Beal, of Scio, Ohio, to serve for two years, M. I. Wilbert, of Washington, D. C., to serve for three years, John C. Wallace, of Newcastle, Pa., to serve for four years, and Chas. Caspari, Jr., of Baltimore, Md., to serve for five years. Jas. H. Beal was elected chairman.

The progress in pharmacy as recorded by this meeting is largely reflected by the creation of this Commission on Proprietary Remedies and by the series of resolutions endorsed at the final session of the Association.

To the disinterested observer who was limited in his sources of information to the reflections manifested in the papers read before the section on education and legislation and the discussion at the joint conference of this section with members of boards of pharmacy and teachers in pharmaceutical schools, it would appear that from an educational point of view the meeting this year was particularly uneventful. This fact when compared with the very decided progress reported in connection with medical education, at the meeting of the American Medical Association at Minneapolis in June is to be deplored. It should not be overlooked, however, that at the second meeting of the Section on Education and Legislation a commitee was appointed to consider the standardization of a three-year course in pharmacy. Owing to lack of time and some doubt as to what was expected the members of the committee were unable to formulate a report and on motion this committee was continued to report next year. It is of course not necessary to add that the members of this committee have an excellent opportunity to call attention to the prospective needs of pharmacy and the possibility of developing it as a recognized specialty of medicine.

The report of the nominating committee at the second general session of the Association brought with it probably the most unusual demonstration that has ever been witnessed at a meeting of the American Pharmaceutical Association. The nominations for president included the names of Chas. Caspari, Jr., of Baltimore, Caswell A. Mayo, of New York, and Otto Raubenheimer, of Brooklyn. Professor Caspari, who had served the Association for a number of years as General Secretary asked permission to withdraw his name. This request was opposed by John Uri Lloyd and others who asserted that the members of the Association desired the opportunity of showing their appreciation of the services that had been rendered by Prof. Caspari. The members present, in the course of the address made by Prof. Lloyd, frequently evidenced their appreciation of the sentiments expressed and at the close of the remarks continued their applause for a considerable time. Despite the evident desire of the members present that he continue as a candidate, Prof. Caspari insisted that his name be withdrawn and James H. Beal, the Secretary of the Association put in nomination the name of W. C. Anderson, of New York. This nomination was seconded by John C. Wallace, of New Castle, Pa., and Otto F. Claus, of St. Louis. No other names being offered, nominations were on motion closed and the members of the Association will have the rather unusual opportunity of selecting a president from nominees resident in the same city. As a matter of more than passing interest it may be pointed out that all of the nominees are comparatively young men though well and favorably known to pharmacists generally.

Caswell A. Mayo, who was the first to be placed in nomination, is well known as the Editor of the American Druggist. He joined the American Pharmaceutical Association in 1893 and has served as member of the council and as secretary of the Historical Section. At the Denver meeting he was elected to serve as historian and is active in that capacity at the present time. Otto Raubenheimer, a man of many attainments, editor of the Practical Druggist, member of the U. S. P. Committee of Revision, the Committee on National Formulary, the Committee on Unofficial Standards, and the Committee on Recipe book, is the original and at present the only American professor of the history of pharmacy, having been recently elected to fill that chair in the School of Pharmacy of the

University of the State of New Jersey. He was elected to membership in the American Pharmaceutical Association in 1902, and has served as Secretary and as chairman of the Section on Historical Pharmacy and as chairman of the Section on Practical Pharmacy and dispensing. William C. Anderson, Professor of Pharmacy in the Brooklyn College of Pharmacy, is well known to the retail druggists of the country, having served as president of the National Association of Retail Druggists and as chairman of the National Committee of formulas of the American Druggists' Syndicate. He was elected to membership in the American Pharmaceutical Association in 1900 and has served as Secretary of the Section on Commercial Interests.

The Section on Scientific Papers presented a rather comprehensive programme including a total of fifty-six communications and covering practically all phases of scientific pharmacy. Among the more interesting of the communications was one by H. M. Gordin and Jay Kaplan on the comparative adsorption of different substances by Lloyd's reagent; animal charcoal and aluminum hydroxide. This paper was read by Prof. John Uri Lloyd, who also presented a short paper of his own and exhibited a number of samples of adsorbed alkaloids which were practically tasteless. He also exhibited a number of samples of alkaloids produced by means of his reagent. In the course of the discussion on this subject it was pointed out that pharmacists frequently lose sight of the possibilities of physical phenomena and that filtering media such as kaolin and fuller's earth when used in connection with liquid preparations containing alkaloids would serve to materially reduce the alkaloid content of such preparation.

A paper by L. F. Kebler on the lack of uniformity in tablets, emphasized the need for greater care in the manufacture of this class of preparations. The discussion on a paper by William Mansfield on papain of commerce called renewed attention to the difficulties encountered in any attempt to standardize little used drugs or preparations and suggested the desirability of restricting work of this kind to the more important generally recognized remedies that are widely used.

The Section on Practical Pharmacy and Dispensing presented a programme containing a total of thirty-one communications, and several, at least, of these papers contained points of practical value and elicited considerable discussion. A paper by J. Leon Lascoff on camphorated oil in ampoules involved a discussion on sterilization which evidenced the fact that at the present time the importance of this procedure is not always properly recognized by the pharmacist.

The Section on Education and Legislation had several sessions largely devoted to the discussion of laws relating to poisons and habit-forming drugs. A paper by B. L. Murray on some aspects of our poison laws discussed the nature of poisons and suggested the desirability of adequately defining a poison. The report of the delegates of the American Pharmaceutical Association to the American Drug Trade Conference was followed by a paper by Frank H. Freericks on the National Drug Trade Conference and the so-called Harrison antinarcotic bill, in the course of which Mr. Freenicks submitted a number of resolutions which, after considerable discussion, were referred to the house of delegates, but evidently failed to receive the endorsement of that body.

A paper on the standardization of a three-year course by H. L. Taylor was practically the only contribution along educational lines. This paper, as noted above, was referred to a special committee to report next year.

In the section devoted to the discussion of pharmacopœias and formularies, the Chairman of the Committee of Revision of the Pharmacopœia of the United States presented a comprehensive report on proposed changes in the Pharmacopœia, and also ventured the statement that the new Pharmacopœia was now 90 per cent. complete and that printing would probably begin in the very near future.

The Chairman of the Committee on National Formulary reported that the members of the Committee present at Nashville had held several meetings and that the work of revision was practically completed so far as formulas were concerned. He also presented a copy of the completed draft of the Formulary.

The Chairman of the Committee on Unofficial Standards reported that monographs for many of the drugs needed in the formulas of the National Formulary, and not included in the Pharmacopœia, had been prepared and that the few remaining monographs would be ready in the very near future, thus practically completing the work of revision.

The sterilization of apparatus and of pharmaceutical preparations was considered in connection with several communications presented this year, but was discussed at quite some length by Dr. A. B. Hitchins in a lecture before the Section on Pharmacopœias and Formularies. This communication and the discussion that followed emphasized the impracticability of outlining a reliable procedure for sterilizing articles of any kind without adequate bacteriologic control. The nature and extent of this control is of course dependent on the uses to which an article is to be put and the only really safe authoritative direction for sterilization is one similar to the one now embodied in the new German Pharmacopœia which directs that: "The sterilization of receptacles, medicines and surgical dressings is to be done according to the rules of bacteriologic technique with proper consideration of the properties of the articles to be sterilized."

The Section on Commercial Interests had a rather limited programme, a greater portion of the time of the session being devoted to a lecture by Ben R. Vardaman on the art and science of making a sale, which was much appreciated by the members present.

Considerable opposition on the part of female as well as male members of the Association was evidenced in connection with the newly created women's section of the American Pharmaceutical Association. It was pointed out by several members that the purpose of this section could be construed as discriminating against women who have shown their ability to cope with men in all lines of pharmaceutical activity and are well able to take part in the proceedings of the now existing sections of the Association. The large proportion of non-members of the American Pharmaceutical Association who took part in the proceedings of the section this year also suggested to some the desirability of renaming the section and forming a women's auxiliary to the Association rather than a section devoted to professional representation on the part of women pharmacists.

The following resolutions, favorably reported on and endorsed by the Committee on Resolutions of the House of Delegates, the members of the House of Delegates, and the members of the Council of the American Pharmaceutical Association, were adopted by practically the same persons acting as the American Pharmaceutical Association at the concluding session on Saturday, August 23d:

That the U. S. Department of Agriculture be urged to collect, and maintain a collection of plants which shall be used to authenticate the various drugs used in pharmacy;

That a committee be appointed to consider the practicability of devising a blank certificate of award for A. Ph. A. membership prizes by colleges of pharmacy, and state boards of pharmacy;

That the A. Ph. A. endeavor to secure and to enforce laws requiring that each pharmacy and drug store have on hand a copy of the latest editions of the Pharmacopœia of the United States and of the National Formulary;

That the American Pharmaceutical Association favors the further development of professional education;

That the Association endorses the enactment of laws restricting the sale of methyl alcohol;

That the members of the American Pharmaceutical Association present at this meeting are heartily in favor of securing a building to be used as the official headquarters of the Association;

That the Association urge the passage of the Macon-Hughes Bill for the better treatment of members of the Hospital Corps of the U. S. Army;

That the members present approve of the production of an official button;

That the " zone " system of parcel post be endorsed;

That efforts be made to lessen the number of poisoning cases from the use of poisonous tablets intended for external use;

That the U. S. P. and the National Formulary Committees of Revision be requested to indicate in some way all toxic drugs;

That the members of the Association present favor a radical revision of existing patent and trade-mark laws;

That the Association endeavor to secure a revision of the existing Internal Revenue laws, so as to provide for a drug store license distinct from the present liquor dealers' license;

That the American Pharmaceutical Association is heartily in favor of greater uniformity in so-called antinarcotic laws;

That the members of the American Pharmaceutical Association extend to Messrs. Harrison, Wright and others, their appreciation of work done in connection with the proposed law to restrict interstate traffic in opium, cocaine, their alkaloids, derivatives and preparations;

That the members of the American Pharmaceutical Association heartily endorse the provisions of H. R. 6282, as referred to the Committee on Finance of the Senate of the United States;

That there is a great need for reform in the matter of physicians dispensing poisons and drugs which are exempted from the regulations placed upon drugs dispensed by pharmacists;

That an effort should be made to secure the enactment of state laws doing away with such exemptions;

That Section 7 of the Food and Drugs Act, June 30, 1906, be amended to restrict deviations from the official standards;

That the several revision committees be requested to include synonyms in the U. S. P. and N. F.;

That efforts to secure greater uniformity in pharmacopœial nomenclature be endorsed, and that the delegates to the International Congress of Pharmacy be instructed to favor the appointment of a commission to secure international uniformity.

The Secretary of the Association was on motion instructed to forward a telegram to the Committee on Finance of the Senate of the United States and to Representative Francis B. Harrison, advising that the A. Ph. A. had endorsed the act known as R. H. 6282 and was heartily in favor of its passage at the present session of Congress.

The Committee on the Procter Monument Fund reported that the necessary funds to insure the erection of the monument in the Smithsonian grounds at Washington, D. C., were now in hand and recommended that a committee of seven be named to complete arrangements for the erection of the monument and to pass on the models of the sculptors that may be submitted. After some discussion it was on motion agreed that the present committee be continued with instructions to select an executive committee of seven members to have immediate charge of the erection of the monument.

The meeting of the American Pharmaceutical Association in 1914 is to be held in the City of Detroit. Mr. Leonard A. Seltzer, one of the more aggressive pharmacists of that City and a member of the Michigan Board of Pharmacy, was elected to serve as Local Secretary.

Albert B. Lyons, of Detroit, Michigan, was elected Honorary President.

In concluding this brief review of the proceedings, it may be pointed out that the meeting of the American Pharmaceutical Association at Nashville has once more demonstrated the impracticability of holding the interest of members by the presentation of a discontinuous program according to which sessions of the several sections are to be held at varying times in widely separated rooms.

With the elimination of the antiquated provisions of the by-laws requiring that certain meetings be held at certain times it is to be hoped that the program will be arranged to provide for continued meetings of sections at a time and place previously arranged for and announced on the printed program. A serious effort in the direction of simplification of the proceedings might well be made on the authority of a motion made by H. P. Hynson, which authorizes the council to take up the matter of creating a conference committee for the bringing about of a closer coöperation in regard to the programs of the various affiliated organizations. If in addition to this some of the now evidently unnecessary duplication of work were eliminated much time for profitable discussion on timely topics might be gained.

Many years ago a proposition was made that the important business could well be conducted in two general divisions or sections, theory and practice, that the meetings of these divisions be continued during the day only and that the council and the affiliated organizations have their meetings at night. A practical application of this suggestion accompanied by a further elaboration of the duties of the council and the elimination of the so-called House of Delegates would appear to offer possibilities for practical advances well worth considering. M. I. W.

BRITISH PHARMACEUTICAL CONFERENCE.

By John K. Thum, Ph.G.,
Pharmacist at German Hospital, Philadelphia.

The 1913 meeting of the British Pharmaceutical Conference was held in London, the Sessions of the Conference commencing Tuesday, July 26. The attendance was greater than at any previous meeting in the history of the Conference, this, no doubt, being brought about by the fact that this meeting was the fiftieth and the Jubilee of the Conference.

While the various papers read at the Conference were of an unusually high order of merit and quite in keeping with past traditions of this organized body of pharmacists, the feature of the meeting was the admirable address of the president, Mr. John C. Umney.

Revision and publication of the British Pharmacopœia, he stated, was a subject of great importance to pharmacy at the present time, and the principal part of his address was devoted to a detailed and comprehensive résumé of pharmacopœial revision for the past century. While the pharmacists of the United States have, for many revisions of their Pharmacopœia, practically played a predominant part in this sort of work with physicians taking but a slight interest, conditions in Great Britain have always been the opposite. There, the pharmacists have practically no official standing and receive no recognition for any work done in connection with pharmacopœial revision. That this state of affairs is inconsistent and should no longer continue is the plea made by the president of the Conference and he argues that as the pharmacists now receive State recognition as dispensers of medicine the time is ripe for the British pharmacists to strive for a readjustment of functions, both from a medical and pharmaceutical standpoint, and he urges "that this should be done with amity on both sides."

He then goes on to show by way of contrast how pharmacopœial revision is accomplished in the other principal countries of the earth, stating that the only country besides his own that has a Revision Commission from which practising pharmacists are excluded is Italy.

He states that the right of the General Medical Council to publish the British Pharmacopœia can only be abrogated by act of Parliament and that now is the opportune time for the promotion of a bill to that effect.

The President presents for the consideration of the Conference the text of a bill which covers the important problems of revision of the pharmacopœia, along the lines of an Imperial Pharmacopœia, in which there is representation of medicine and pharmacy in the mother country, India, and the colonies.

The following papers were communicated to the meeting:

THE STANDARDIZATION OF OPIUM FOR PHARMACEUTICAL PURPOSES.

BY P. VAN DER WIELEN.

The writer of this paper states that it is certain that the action of opium is not caused by morphine alone, and as the quantity of the other alkaloids vary and probably in the same proportion as morphine, it follows that standardization of morphine alone does not make certain an invariable preparation, though as a matter of fact it is better than no standardization at all. He urges the making of an opium by mixing four opiums of different origin without the addition of inert material. This he would term a "normal opium"—in other words standardized for total alkaloids and meconic acid.

THE MYRRH OF COMMERCE, ANCIENT AND MODERN.

By E. M. HOLMES.

The author gives a very detailed description of this drug, one of the earliest spoken of in history. He states that it is generally understood that the myrrh mentioned in the Bible is the medicinal myrrh, but such is not the case. In Somaliland where both the medicinal and perfumed myrrh are produced they are known as Mal-mal and Habbak Hadi, *i.e.*, the gum of the Hadi tree; the latter, the perfumed myrrh, is the produce of *Commiphora erythroea* var. *glabrescens*. The medicinal of course, is *Commiphora Myrrh*, and, as is well known, is frequently mixed with other resins. He gives a brief but interesting description of the trees yielding myrrh.

CHEMICAL EXAMINATION OF WHEAT GERM.

By F. B. POWER AND A. H. SALWAY.

The material known as wheat germ was formerly a waste product of the flour mills, sometimes used as a fodder. Recently it has come into use as an ingredient of certain kinds of bread because of its dietetic value. It contains considerable fat and a high nitrogen content. It is also the best known source of phytosterol. It has been shown by other workers that wheat germ contains: choline, betaine, allantoin, cane sugar, dextrose, and raffinose, and in their examination this was confirmed by the authors of this paper, although no evidence was obtained showing the presence of asparagine, which has been recorded as present by Frankfurt. They also discovered the presence of sinapic acid, thought to be only present in mustard seed or at least in the family of *Cruciferæ*.

THE STRUCTURE OF THE SOYA BEAN.

By T. E. WALLIS.

The author gives a complete macroscopical and microscopical description of the characters of the soya bean. The illustrations that accompany this paper were drawn by the author and will be of great value to those whose work is analytical in character, particularly in food stuffs. The increasing use of the soya bean will undoubtedly lead to its adulteration with ground meal.

SOME FACTORS IN THYROID PHARMACY.

By R. Glode Guyer.

Observations on the thyroid glands obtained from Scotland were made by the author. He found that the weight varied considerably. The influence of the age of the sheep and class of breed was also taken into account, and the author states that the ratio of dried to moist substance is 1 to 3.6. He also thinks too much stress is laid on the iodine content and that on this point much more work is necessary.

FURTHER REPORT ON IODINE CONTENT OF THYROID GLAND.

By N. H. Martin.

The author submits a tabulation of a series of determinations of the iodine content of thyroid glands obtained from a certain district as compared to some from same district last year. He maintains that a strength of 0.25 per cent. would not be too high for supplies of the gland from this district.

EXTRACT OF MALE FERN.—ANALYTICAL NOTES.

By C. A. Hill.

The best safeguard against the adulteration of extract of male fern, the author states, is an assay process for filicic acid, with chemical and physical constants of the genuine product. A content of 22 per cent. of the filicic acid, or filicin, he would regard as not too high for a genuine extract.

AN EXAMINATION OF THE ESSENTIAL OIL OF WITCH HAZEL.

By H. A. D. Jowett and F. L. Pyman.

The writers give considerable data of an experimental nature of work done in connection with the oil from *Hamamelis virginiana.* Their results agree pretty closely with those of Scoville, whose conclusion was that the oil consists chiefly of a terpene.

A trace of a phenolic substance, a mixture of fatty acids in the free and combined state, and a mixture of solid saturated hydrocarbons were also separated, while indications of the presence of other compounds, including oxygenated substances, were also obtained.

ERGOT AND ITS PREPARATIONS: A CRITICAL REVIEW OF THE REQUIREMENTS OF THE BRITISH PHARMACOPŒIA.

By F. N. Carr and H. H. Hale.

In the light of present-day knowledge of ergot pharmacopœial revision of the preparations of this interesting drug is very necessary. Among the many interesting suggestions offered by the authors of this paper is one relating to ergots other than that growing on rye, which they think should receive official recognition, provided that an acceptable method of standardization for active alkaloid could be worked out. The authors examined some ergot from the tall fescue grass (*Festuca arundinacea*), which grows wild in vast swampy areas in New Zealand, and is said to be constantly and heavily infected with ergot. They estimate this ergot to be three times as active as an average specimen of good rye-ergot which usually contains about 0.1 per cent. of ergotoxine.

They also advise that Extractum Ergotæ (Ergotin) of the British Pharmacopœia should be dropped. "If a soft extract is needed, as in the preparation of pills, the extraction should be carried out with 60 per cent. alcohol, and to this citric acid should be added instead of HCl. The acid might with advantage be added to the alcohol before the extraction is performed. Such a product could be evaporated to a soft extract without filtration, and would contain practically the whole of the active constituents of the ergot."

They also regard the fluidextract of the U. S. P. as superior to the Extractum Ergotæ Liquidum of their pharmacopœia and advise its adoption. Its adoption would also have the further advantage of tending to international uniformity.

THE DETERMINATION OF HYPOPHOSPHITES, WITH NOTES ON COMMERCIAL SAMPLES.

By J. T. Cocking and J. D. Kettle.

For the determination of hypophosphites the authors found that potassium dichromate is of decided advantage compared to other oxidizing agents, particularly as the pure salt is easily obtained, solutions made from it are very stable, and an exact volumetric solution can be prepared from the pure dry salt without further standardizing. Considerable data are given whereby this method was used for the determination of the various hypophosphites.

A NOTE ON THE ALLEGED POISONOUS PROPERTIES OF HONEY FROM DATURA STRAMONIUM.

BY B. H. DEANE.

The author shows in an interesting manner how the statement that honey from Datura Stramonium is poisonous became embodied in the literature relating to honey. It appears that a Consul at Trebizonde in a report to his government makes the statement that honey from that section of the world is unfit for food—in fact, poisonous and that the poisonous principle contained therein is from the flowers of *Datura Stramonium.* Mr. Deane shows that this is impossible because the structure of the flower of this plant makes it impossible for bees to visit it. He also makes the observation that it does not necessarily follow that because other parts of the plant are poisonous the nectar secreted by the flowers is likewise. It is known that honey bees visit the flowers of *Atropa Belladonna,* yet no bad effects have ever been attributed to such honey.

THE COMPOSITION OF CERTAIN FORMATES.

BY C. H. HAMPSHIRE AND W. R. PRATT.

The writers give the result of a very careful and comprehensive investigation of commercial specimens of the principal formates. They give in detail the analytical methods used to determine the exact composition of sodium, ferric, magnesium, calcium, quinine, and strychnine formate.

NOTE ON SODIUM THIOSULPHATE SOLUTIONS.

BY C. H. HAMPSHIRE AND W. R. PRATT.

Having need in the course of some chemical examinations to make titrations with sodium thiosulphate solutions the authors restandardized them each time before use. They noticed, however, that standard solutions of decinormal strength remained unchanged for many weeks even when exposed to daylight in bottles of white glass. No less than a dozen authoritative works on chemistry contain statements to the effect that solutions of this salt are unstable and require standardization.

The authors give the result of a series of examinations under varied conditions and prove that while there may be some decomposition on keeping it is so slight as to render unnecessary the elaborate precautions advised in literature. After eight months they found solutions reliable without restandardization.

THE PROPORTION AND COMPOSITION OF THE ALCOHOLS IN GERANIUM OILS.

BY W. H. SIMONS.

The principal constituents of the geranium oils are geraniol and citronellol, both free and combined, but few attempts are made to differentiate between them. The total alcohols are usually determined and calculated as geraniol. The author, using the formylation process as recommended by Jeancard and Satie confirms the findings of these workers that the Bourbon oil contains more citronellol than the African oil.

MERCURIC OXIDE AS A STANDARD FOR VOLUMETRIC ANALYSIS.

BY L. ROSENTHALER AND A. ABELMANN.

The authors found that we have in mercuric oxide a substance at our disposal that is useful for the four chief volumetric operations—acidi- and alkali-metry, iodimetry, oxidimetry, and argentometry. They give in detail their method of use and results obtained and seem to prove their case.

NOTES ON THE POLENSKE AND REICHERT VALUES OF SOME OILS.

BY G. D. ELSDON AND H. HAWLEY.

With the exception of one or two edible oils there are practically no Polenske figures available in literature; for this reason the authors thought it might be of interest to determine this figure on various oils. They found that the Polenske values for different samples of the same oil are much more constant than are the Reichert values.

POWDERED RHUBARB.

By E. T. Brewis and H. Deane.

The authors endeavored to discover what would be a fair standard of extractive for rhubarb if such a requirement were demanded in the forthcoming British Pharmacopœia. They seem to think that the minimum of 35 per cent. required by the German Pharmacopœia is reasonable. The quality of powdered rhubarb at present on the market was carefully examined. The limit of ash of 12 per cent. suggested by the Committee of Reference in Pharmacy would include most of the powdered rhubarb found in commerce.

ESSENTIAL OIL INDUSTRY: 1909.

Statistics of the essential oil industry in the United States for 1909 are presented in detail in a bulletin soon to be issued by Director Harris of the Bureau of the Census, Department of Commerce. It was prepared under the direction of W. M. Steuart, chief statistician for Manufactures.

Summary of Statistics.—The number of establishments reporting in 1909 was 68, with 408 persons engaged in the industry, capital of $1,365,438, and expenses of $1,522,171, of which $184,495 was paid for salaries and wages and $1,255,478 for materials. The value of the products reported was $1,737,234.

The average number of persons engaged in the industry during 1909 was 408, of whom 290 were wage earners, 91 proprietors and officials, and 27 clerks, etc.; 390 were males and 18 females. No wage earners under 16 years of age were reported.

Leading Producing States.—The five leading states in the manufacture of essential oils in 1909 were Michigan, New Jersey, Connecticut, New York, and Pennsylvania, in the order named; in 1904, the five leading states were New York, Connecticut, New Jersey, Michigan, and Indiana. Michigan ranked first in 1909, with products valued at $486,159, or 28 per cent. of the total, and fourth in 1904, with products valued at $240,215, an increase for the 5-year period of 102.4 per cent., while New York ranked fourth in 1909, with products valued at $195,363, and first in 1904, with products valued at $502,014, a decrease of 61.1 per cent. For the industry as a whole the increase in value of products from 1904 to 1909 was 18.6 per cent.

Character and Output of Establishments.—Of the total establishments in the industry, 16.2 per cent. were under corporate ownership in 1909, as compared with 13.5 per cent. in 1904; these establishments reported 68 per cent. of the total value of products in 1909 and 45.1 per cent. in 1904. Establishments under firm ownership decreased considerably in relative importance during the 5-year period, reporting only 3.8 per cent. of the total value of products in 1909, as compared with 34 per cent. in 1904.

Of the 68 establishments in 1909 and 52 in 1904 there were 5 at each census whose products were valued at more than $100,000, with 74.6 per cent. of the total value of products in 1909, as compared with 77.8 per cent. in 1904. The average value of products per establishment decreased from $28,167 in 1904 to $25,548 in 1909. The average number of wage earners per establishment increased from 2.5 in 1904 to 4.3 in 1909.

Value of Products.—The production of essential oils increased in value during the decade 1899–1909 from $700,709 to $1,108,603, or 58.2 per cent., while the value of the witch-hazel extract produced in 1909 was $412,322, over seven times that in 1899, which was $54,649. The production of each kind of essential oil was considerably greater in 1909 than in either 1904 or 1899. The production of witch-hazel in 1909, however, represented a decrease of 14.9 per cent. as compared with 1904, when the value was reported as $367,873, although it was more than six times as great as in 1899.

Materials and Products.—The principal materials used in the industry are grain alcohol, crude essential oils for refining, and the herbs, leaves, bark, roots, etc., from which the crude oil is extracted. The consumption of grain alcohol in the industry amounted to 75,274 gallons, costing $188,618, in 1909, as compared with 84,602 gallons, costing $206,255, in 1904, and 13,258 gallons, costing $44,888, in 1899.

Connecticut is the chief producer of oil of black birch and witch-hazel extract; Michigan, of oil of peppermint, spearmint, tansy, and wormwood; New Jersey, of oil of wintergreen; and Virginia, of oil of sassafras.

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EXPERIMENTAL WORK IN AN ENGLISH HERB GARDEN.

By Francis H. Carr, F.I.C.

Investigators in the domain of agricultural chemistry have devoted a greater measure of attention to the productiveness of the soil than has been given to the chemical composition of the crops concerned. From this generalization we must, however, except to some extent those workers engaged upon the study of sugar-producing crops by whom great success has been achieved in raising the percentage of sugar in root crops.

In the case of medicinal plants there is much need for investigations of this character and this need is rapidly becoming greater as it becomes more forcibly understood that the medicinal value of different samples of the same drug may vary enormously.

It is this latter consideration which has led to the increasing demand for the standardization of drugs and of their preparations, an advance for which pharmacy owes much to the compilers of the eighth revision of the United States Pharmacopœia.

Whether or not an extension of our knowledge in the direction indicated will ever render it possible in a practical way to control the amount of active principle present in a plant grown under cultivation, it must be admitted that the investigation of such a problem is of great practical importance as well as of deep scientific interest.

In work of this character there are so many variable factors concerned that before generalizations may safely be considered, we require to make a vast accumulation of accurate data, and such accumulated results are not yet available.

At the Wellcome Materia Medica Farm, situated at Dartford, Kent, England, investigations on these lines have been proceeding for the past eight years.

In the following short account of these investigations, is included a record of the more recent results, hitherto unpublished.

For obvious reasons the investigation of those plants which owe their medicinal value to some compound such as an alkaloid, a glucoside or an essential oil which can readily be determined, is the most suitable to undertake. At the Wellcome Materia Medica Farm attention has mostly been devoted to alkaloid-producing plants.

The land employed is situated on chalky hills and has a south-west aspect. The soil is light, permeable and chalky. The following is an analysis of a representative sample of the dry soil after removing pebbles, etc., which represent about 20 per cent. of its weight:

Ca CO_3	11.4 per cent.
K_2O	0.4 per cent.
Fe_2O_3 and Al_2O_3	6 2 per cent.
H_3PO_4	0.6 per cent.
Total loss on ignition	9.5 per cent.
Insoluble in acids	72.2 per cent.

The photographs which are here reproduced, showing crops of belladonna and hyoscyamus, will serve to convey a general idea of the surroundings of the farm.

The experiments have been made in most detail in the case of *Atropa Belladonna*, but before describing them a brief review of other work may be given. An analysis of the dried stem and leaf of *Cytisus Scoparius* (Broom), gathered monthly during twelve months, was made by Carr and Reynolds (*P. J.*, 1908, 80, 542).

The results, which are recorded below, prove in a conclusive manner that in this instance the plant stores up its alkaloid during the quiescent months of autumn and winter and that it rapidly disappears from the stem and leaf during the growing and flowering period.

ANALYSIS OF BROOM-TOPS.

August	0.07 per cent. Sparteine Sulphate
September	0.17 per cent. Sparteine Sulphate
October	0.34 per cent. Sparteine Sulphate
November	0.46 per cent. Sparteine Sulphate

December	0.36 per cent. Sparteine Sulphate
January	0.36 per cent. Sparteine Sulphate
February	0.38 per cent. Sparteine Sulphate
March	0.53 per cent. Sparteine Sulphate
April	0.44 per cent. Sparteine Sulphate
July	0.23 per cent. Sparteine Sulphate

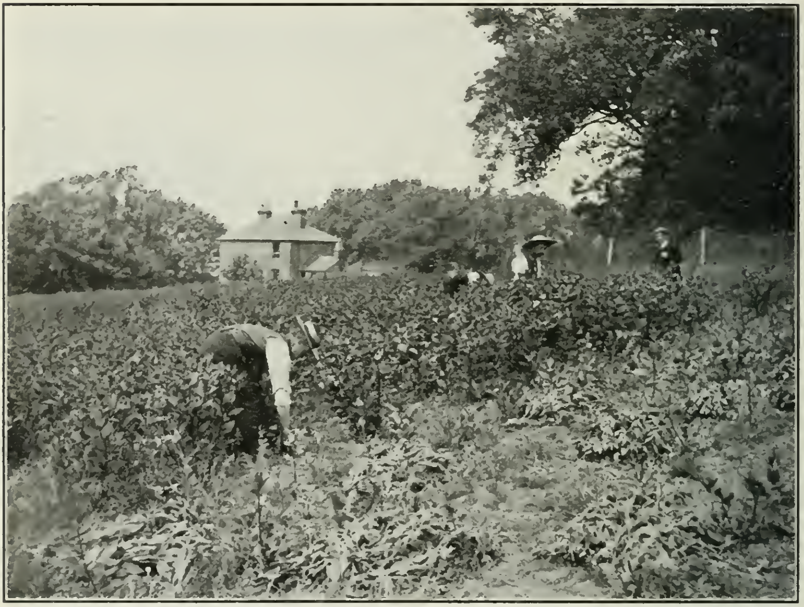
Chevalier, who, since the publication of these results, has confirmed them, has suggested (*Compt. Rend.*, 1910, **150**, 1068) that the change is due to the alkaloid wandering into the fruit. Since the weight of fruit is so small in relation to the weight of stem and leaf and the percentage of sparteine found in it is only about twice that lost by the stem, this explanation does not, however, account for the whole of the alkaloid lost.

FIG. 1.

Hoeing Belladonna. Wellcome Materia Medica Farm.

Digitalis is a biennial plant and it is usual only to employ in pharmacy leaves gathered from it in the second year of growth as directed by most pharmacopœias; moreover, it is commonly supposed that the leaves from cultivated plants are inferior to those obtained from the wild plant; we have not been able to find, however, that these requirements have any rational foundation, for first and second year's leaves, grown side by side, have proved identical in their activity and the cultivated leaves are at least as active as those grown wild. As no practical method of chemically testing digitalis is known, the minimal lethal dose (for frogs) has been determined and the plant cultivated on the Wellcome Materia Medica Farm has yielded a B.P. tincture having an M.L.D. of 0.4 c.c. per 100-grams on a three-hour test, thus showing that it is possessed of a very high degree of activity.

FIG. 2.



Gathering Belladonna. Wellcome Materia Medica Farm.

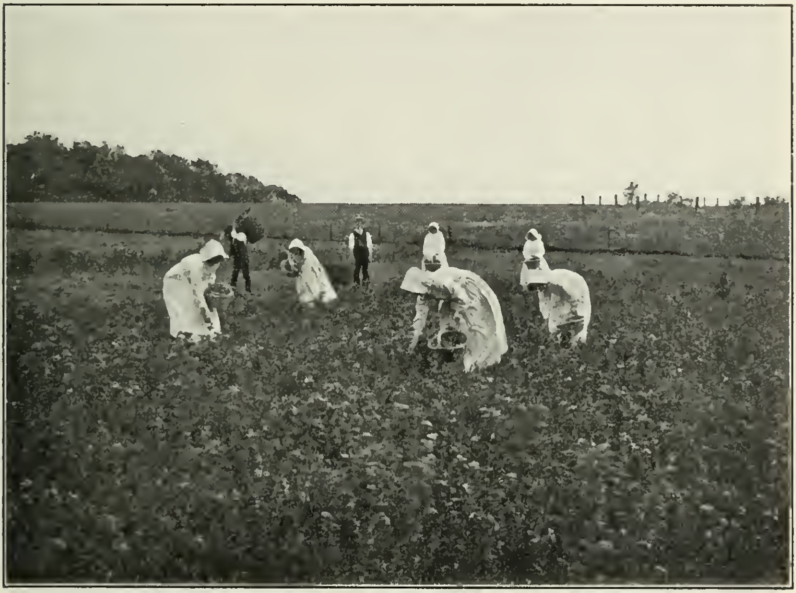
Hyoscyamus niger is also a biennial plant of which it is an official requirement that the second year's growth should alone be employed, yet as regards the activity we find the percentages of alkaloid contained in plants of first and second year's growth are identical, thus, there was found:

First year's growth.... 0.12 per cent. total alkaloid in the dried herb.
Second year's growth.. 0.12 per cent. total alkaloid in the dried herb.

Experiments to determine what conditions are best suited to the production of alkaloid have been made both with hyoscyamus and belladonna; it will suffice our purpose if we give some account of experiments made with the latter plant.

In the near vicinity belladonna was occasionally found growing wild before these experiments were undertaken which indicated, what was in fact found to be the case, that the soil was very well suited to the plant. Dissemination of the seed by birds has since made its occurrence still more common.

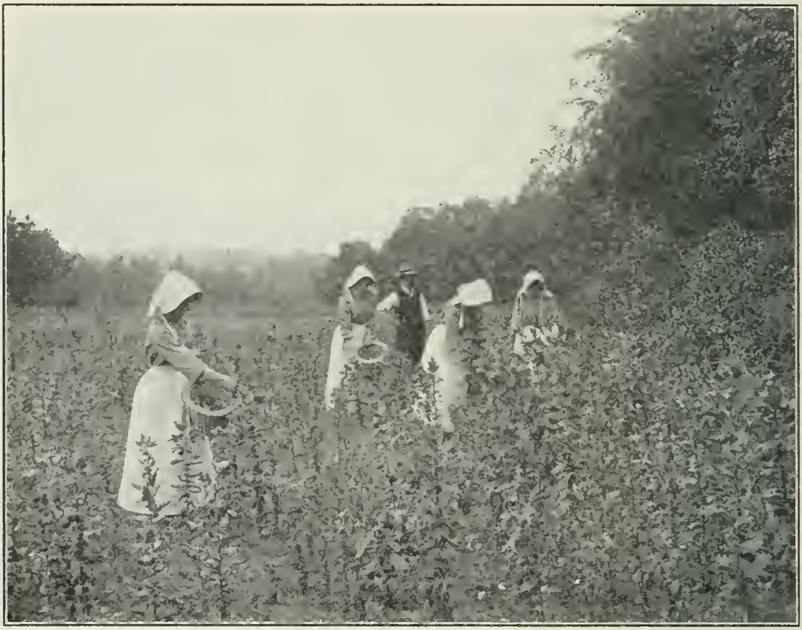
FIG. 3.



Gathering Hyoscyamus. Wellcome Materia Medica Farm.

Wild belladonna plants were obtained from various parts of England and after propagating these for two years, one strain, found to yield a high percentage of alkaloid and to give good growth, was selected and exclusively employed. It has been stated by many observers that the cultivated belladonna plant contains less alkaloid than that which grows wild. This statement, which is no doubt true of plants transported to a soil unsuited to them, has not been confirmed by the author's experience, indeed on the whole the cultivated plant has been found to contain a little more alkaloid than that grown wild. The percentage of alkaloid found in the leaves and stem of the dried wild plant was 0.49, while the average of that found in the cultivated plant during the eight years 1906-1913 was 0.57. As other investigators have usually recorded about 0.45 per cent. in the wild plant it may be assumed that the plant employed was satisfactory, it therefore follows that the effect of cultivation has been beneficial.

Fig. 4.



Gathering Hyoscyamus. Wellcome Materia Medica Farm.

In the following table a number of analyses of belladonna stems and leaves, grown under treatment with various fertilizers on the same plot for four successive years are given:

Fertilizers			Percentage of alkaloid by titration in dry stem and leaf										
Treatment	Time of application	Amount of each application per acre	1910. First year's plants	1911. Second year's plants	1912. Third year's plants					1913. Fourth year's plants			Mean
					June 1st	July 1st	Aug. 1st	Sept. 1st	Oct. 1st	June 1st	July 1st	Aug. 1st	
Main crop	. . . .	. . . .	0.61	0.59	0.68	0.59	0.68	0.73	0.44	0.65	0.64	0.62	0.62
Farmyard manure	March	50 loads	0.61	0.53	0.71	0.51	0.54	0.48	0.36	0.58	0.40	0.38	0.51
Sodium nitrate	March, April, May and June	2–cwt.	0.54	0.46	0.64	0.43	0.38	0.53	0.32	0.54	0.52	0.45	0.48
Calcium Cyanamide	May and June	1–cwt.	0.69	0.49	0.75	0.40	0.52	0.46	0.34	0.63	0.44	0.53	0.52
Basic Slag	May and June	2–cwt.	0.65	0.56	0.84	0.51	0.52	0.49	0.39	0.63	0.75	0.42	0.58
Superphosphate	May and June	3–cwt.	0.81	0.49	0.76	0.51	0.52	0.53	0.41	0.63	0.43	0.64	0.57
Kainite	May and June	3–cwt.	0.75	0.53	0.69	0.39	0.57	0.56	0.33	0.57	0.55	0.36	0.53

It will be seen from a consideration of these results that the effect of fertilizers upon the percentage of alkaloid is small, tending to lower it. This tendency, which is most marked in the case of nitrogenous manures, appears to be due to the larger growth which results from such manuring—the larger growth producing more weight of woody fibre. In every case the percentage of alkaloid compares favorably with that contained in wild plants, showing that cultivation is advantageous. As regards the amount of plant harvested a rich nitrogenous fertilizer such as farmyard manure or a mixture of sodium nitrate, basic slag and kainite will increase it several fold if the soil is not already a rich one.

These results indicate that the stage of growth at which the plants are harvested is not important at least as regards alkaloidal content, provided that the plant has not begun to fade when there is a rapid loss of strength, but it appears as is shown below that adverse weather conditions may be the cause of variations.

In the following table the percentages of alkaloid present in the dry stem and leaf are shown in parallel columns with the amount of sunshine and rainfall recorded in London, 16 miles distant from the farm.

Year	Percentage of alkaloid in stem and leaf	Total hours sunshine May 1st to June 30th	Rainfall (Same period)
1905	0.38	387 hours	5.48 inches.
1906	0.54	361 hours	3.86 inches.
1907	0.34	290 hours	3.54 inches.
1909	0.48	387 hours	5.44 inches.
1910	0.61	360 hours	4.08 inches.
1911	0.59	404 hours	3.62 inches.
1912	0.59	360 hours	4.48 inches.
1913	0.65	410 hours	2.20 inches.

It will be seen that the highest percentages of alkaloid were observed in the driest and sunniest seasons while the low percentages found in 1905 and 1907 are explained by the heavy rainfall in the former and the lack of sunshine in the latter season.

BELLADONNA ROOTS.

Belladonna root of commerce varies greatly in alkaloidal strength. In a number of analyses made of commercial roots, variations from

0.27 to 0.69 per cent. have occurred. The average of twenty-one analyses of German and Austrian commercial roots was 0.40 per cent.

Other observers have recorded similar results.

Chevalier (*Compt. Rend.*, 1910, 150, 344) gives the following figures for continental roots:

French	0.300–0.450 per cent.
Austrian	0.251–0.372 per cent.
Italian	0.107–0.187 per cent.

Henderson (*Pharm. J.*, 1905, 75, 191) has shown the average of thirty samples for foreign root to be 0.3 per cent.

It is interesting to observe that the average of nine samples of root grown at Dartford is 0.54 per cent.

In order to determine whether this variation was due to collecting at different times of the year, roots from the same plot, derived from second year's plants which had been sown at the same time, were dug up at intervals and dried. The following is a record of the analysis of these samples:

March, 1911	0.56 per cent.
May, 1911	0.59 per cent.
June, 1911	0.53 per cent.
August, 1911	0.50 per cent.
December, 1911	0.59 per cent

The amount of variation throughout the year is thus seen to be very small; there appears, however, to be slightly less alkaloid present during August, when the fruit is ripening. We must therefore seek other explanations for the low percentage of alkaloid present in commercial belladonna root. If one considers the figures recorded by various observers it appears that in the warmest climates, such as those of Italy and Austria, the lowest proportion of alkaloid is to be observed; and this would account for the high reputation of English belladonna. But no such generalization can be regarded as established until plants grown in those countries in a suitable soil and under careful observation have been submitted to analysis. That such an explanation is not improbable is clear from the published facts relating to other alkaloid-producing plants, which show that different amounts of alkaloid are formed in different latitudes. For instance, Dunstan (*Bull. Imp. Inst.*, 1905, 222) has recorded that *Hyoscyamus muticus* grown in Egypt produces 0.6 to 1.2 per cent. of Hyoscyamine, while the same species grown in India produces only 0.3 to 0.4 per cent. On the other hand, if the harvesting of the crops is done with less care in one country than in another, more decomposition may take place during the process of drying and so cause the observed differences.

In whatever latitude belladonna is grown, it will doubtless be found that the composition of the soil, the use of fertilizers, and seasonal conditions make for small variations.

Wellcome Chemical Works, Dartford, England.

AN INTERNATIONAL PHARMACOPŒIAL BUREAU.[1]

By Professor Joseph P. Remington, Ph.M., F.C.S.

"Peace hath her victories no less renowned than war" is a thought associated in the minds of most Americans when the beautiful city of "The Hague" and her Peace Palace are mentioned, and it is indeed most appropriate that the Eleventh International Pharmaceutical Congress should meet here. Pharmacy is a peaceful art and science, because its votaries in the highest sense are pledged to that glorious work, "the healing of the Nations." But universal peace, at this period of our civilization, is by no means assured, as the terrible sacrifices of the Balkan War are very fresh in our memories. Nevertheless, no one can deny that the great powers of Europe united in an effort, futile though it was, to prevent the awful sacrifices of lives and property. Arbitration as a means of settling national disputes is gaining in strength. War is expensive and it rarely settles anything permanently. Coöperation and amity are now recognized as more effective than a resort to arms, and, if this is true in the affairs of nations, how much more valuable are these attributes in great international movements!

Professor Tschirch has recently contributed to the world a paper on "The Necessity for an International Pharmacopœial Bureau" in which he quotes Professor Ostwald as an advocate of economizing energy in intellectual life and the author presents a convincing argument in favor of establishing such a Bureau.

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[1] Read at the Eleventh International Pharmaceutical Congress, September, 1913.

Pharmacopœias are primarily authoritative books. An International Pharmacopœia, which would be used in all countries and which would replace National Pharmacopœias, has been for many years one of the grand ideas and principal objects of former international congresses. So many difficulties had to be overcome, however, that at the present time such a hope is not likely to be realized. The idea of having an international agreement on the strength and standards of potent remedies has been in a great measure fulfilled through the actions of the Conference Internationale pour l'Unification de la Formule des Medicaments Heroiques, and thus the greatest need of an International Pharmacopœia has been satisfied.

If an International Pharmacopœial Bureau is established with an efficient laboratory attached, there should go with it a department whose object would be the *detection of adulterations.* This is the crying need of the hour. A numerous band of able chemists are intentionally at work preparing medicaments which are deficient in strength and activity. One of the prime objects of these men is to study the rubrics and standards of the Pharmacopœias which describe tests for identity, purity, and strength with a view of circumventing them. Life itself is a struggle between the powers of good and evil. Banks, corporations, business houses, and firms are employing the highest form of mechanical labor to provide burglar-proof safes in which to lock up valuables; the powers of evil are likewise busy and with greater secrecy and quite as much ability are rendering nugatory the efforts of honest men. No sooner is an invention adopted to provide greater security from theft, than hundreds on the other side are scheming to outwit them; this affects Pharmacopœial Revision work. The Committees must search current literature throughout the world and institute experiments in order that tests may be provided which will detect adulterations and distinguish as readily as possible the differences between the false and the true. Adulteration, sophistication, and falsification have existed from earliest antiquity. *To sell nothing for something and make a good profit* was one of the earliest ideas for amassing wealth. Through long training, the world has been accustomed to regard adulterations with a tolerance which is surprising. One may use a fabric intended to be worn as a part of one's clothing if part of the wool or silk contains cotton or some other fibre which is cheaper; this form of crime is not likely to cause the death of an individual, but calcium sulphate crystallized from a suitable solvent in feathery, acicular crystals as a substitute for quinine sulphate presents adulteration in one of its worst forms—the cheating of the sick, helpless, and dying.

A large portion of the text of a pharmacopœia consists in providing tests for the exclusion of foreign substances which are intended by manufacturers to reduce the cost of a medicine. If an International Bureau is established, one of the principal objects should be a subdivision or department for publishing to the world all new tests which are proposed from time to time for detecting fraud.

A Department of Pharmacognosy is just as important as a Department of Analytical Chemistry. Drug collectors gather plants which are used to mix with genuine drugs; these are either inert or do not represent the full activity of the drug. Occasionally this admixture may be due to carelessness or ignorance, but far more frequently it is due to intention. If the text referring to official crude drugs is to serve the highest purpose, substances should be described so as to exclude not only foreign admixtures, but the inert portions of that drug, for these would lower the medicinal activity.

In America, owing to the passage of the Food and Drugs Act in 1906, more stringent regulations have been made for the exclusion of drugs in our ports of entry and their quality has been greatly improved. For years it had been the custom of the exporters in foreign countries to regard America as the dumping ground for drugs which were not salable in European marts. This condition no longer exists, although the habit of sending bad drugs to America has not been entirely abandoned, but the penalty of the loss by transportation and the expense caused by reshipment is a great deterrent, and, as time goes on, conditions will be reversed and America will be regarded as the poorest market in the world for inferior or worthless drugs. The microscope and its revelations have been an immediate cause of the improvement in the quality of Pharmacopœial drugs.

These suggestions are intended solely to aid and further the proposition of Professor Tschirch. The Central Bureau should, of course, be established in Europe; the exact locality should depend upon circumstances, of which the writer is not sufficiently informed. These are the days of concentration and centralization; conservation of forces and the necessity for economizing energy in intellectual life should be dominating factors. National pride and jealousy should be eliminated; coöperation should be the watchword. Success will largely depend upon the ability of the Director of such a Bureau.

Not only should he have a comprehensive knowledge of the articles which enter into a pharmacopœia, but he should have the ability to secure results through the employment of able assistants. So many international projects have failed in times past through the enlargement of the scope of the Congress by promoting immaterial side-lines that the original purpose was lost in the distance; but the detection of adulterations and the collection of information about fraud should constitute an important part of the work.

Science has made prodigious strides and specialization is absolutely necessary. It should be the function of the abstractor to collect *known facts* without prejudice. As the learned author says, " The abstractor should not be a critic." He should collect the facts and present them in various languages to the National Pharmacopœial Commissions in each country. Criticisms should be left to the journals, individuals or pharmaceutical bodies where they properly belong.

An international nomenclature has been advocated of late years and it is " a consummation devoutly to be wished." For the accomplishment of this worthy object, the adoption of an international language seems to be necessary. When Esperanto or some other international language comes into general use, the Bureau might sanction an Esperanto equivalent for their medicaments.

More important would be the unification of standards and distinguishing tests for chemical substances. If the various nations of Europe, America, and Asia could establish a minimum standard for purity in chemicals, it would result in great benefit to the whole world. The adoption by the United States Pharmacopœia in 1903 of what has come to be known as the " purity rubric " has been on trial with most satisfactory results for ten years. By this is meant a minimum standard for purity inserted in the text of the official medicament, thus: Potassii Iodidum—" It should contain *not less than* 99 per cent. of pure Potassium Iodide ($KI = 166.02$)." It will be observed that this does not mean that absolute purity is debarred. A chemical manufacturer may make a product which is purer than the official rubric and may secure more sale for his product by offering a purer article if he wishes to; but he cannot sell for medicinal purposes any chemical which does not reach the minimum standard for purity. Impurity in this case refers to innocuous substances, which, broadly stated, mean traces of other products the presence of which would interfere in no case with the medicinal activity of the chemical. The tests inserted after the purity rubric limit the presence of more than traces of innocuous impurities. Official quinine sulphate may contain traces of other cinchona alkaloids and Kerner's test with modifications may be used for providing a standard. Everyone knows that the elimination of a minute quantity of other substances or salts will often increase the price of a medicament to an extent far beyond the necessities of the case and absolute purity in every case would saddle an enormous tax upon the buyer and consumer. The tests which eliminate poisonous substances as lead, arsenic, etc., should be rigidly enforced. When the purity rubric was established in the United States Pharmacopœia, there was an outcry from the purists and theorists who proclaimed that nothing but chemically and microscopically pure substances should find their place in the Pharmacopœia. But ten years' experience with the purity rubric has demonstrated its value and a great improvement in the uniformity of chemicals used for medicines has been the practical result.

The formulation of a purity rubric for each chemical medicament would be a most important function for a separate international commission. The Eighth International Congress of Applied Chemistry, at its meeting in 1912, recommended the establishment of standards which would render uniform throughout the world tests for limiting the presence of allowable impurities which are innocuous. Commerce would be benefited greatly and loss occasioned manufacturers through the transportation of medicaments to various countries would be greatly reduced. As it is at present, chemicals which reach the standard adopted by one country would be rejected by another country bcause of the varying standards of purity existing to-day in their respective pharmacopœias. Is this not a worthy object for an international congress to take up seriously? No country would object to the importation of a chemical which was above the minimum limit and there would be every incentive for a manufacturer to improve his product, but the law would step in and forbid the importation of an inferior product which was below such limit.

THE DETERMINATION OF UNCOMBINED HYDROCHLORIC ACID IN SOLUTION OF FERRIC CHLORIDE.[1]

By C. H. Briggs.

For the preparation of Tincture Ferric Chloride U. S. P. it is essential that the Solution Ferric Chloride used should have the proper degree of acidity. If the Ferric Chloride does not contain enough free acid, the tincture will become cloudy in the course of time and some of the iron will be precipitated.

The United States Pharmacopœia gives a process for the preparation of Solution Ferric Chloride and prescribes the amount of hydrochloric acid which should be added, but it does not give any method for the determination of free acid in the finished product. Hence, in the examination of this solution, it is necessary to depend entirely on the manufacturer for the free acid content, and if the solution has not been properly made, this may be the source of considerable trouble for the consumer.

A search of the literature failed to disclose any simple method for the determination of free hydrochloric acid in solution Ferric Chloride. A direct titration of the free acid with a standard alkali solution and an indicator is impossible because of the weakly basic nature of ferric hydroxide and its failure to react with indicators. However, the amount of iron in the solution is readily determined, so that if the total amount of chlorides in the solution were known, the amount of free or uncombined acid could be calculated. It was found that the total chlorides could be readily determined by titration with N/10 Silver Nitrate, using the U. S. P. method for titrating acid solutions.

The percentage of iron in the solution multiplied by the factor 1.955 will equal the amount of combined hydrochloric acid. This subtracted from the total hydrochloric acid, previously estimated as chlorides, will give the percentage of free hydrochloric acid by weight.

The calculated amount of free hydrochloric acid in Solution Ferric Chloride U. S. P. is 1.25 per cent. A test of one sample which was claimed to be neutral showed 0.18 per cent. free hydrochloric acid, while a sample labeled U. S. P. tested 2.02 per cent. free acid.

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[1] Paper presented at the Milwaukee Meeting of the American Chemical Society, March, 1913.

It must be noted that the presence of any alkali chlorides or other chlorides in this solution would exclude the use of this method, but these impurities are not apt to be present.

The writer suggests that a test for the amount of free hydrochloric acid in Solution Ferric Chloride be included in the next revision of the United States Pharmacopoeia.

Scientific Department, PARKE, DAVIS & Co.,
Detroit, Mich., March 6th, 1913.

A NEW TEST FOR THE ALKALOIDS OF CINCHONA.

BY G. N. WATSON,
Drug Laboratory, University of Kansas.

An aqueous solution of Quinine Sulphate, when treated with a few drops of a freshly prepared saturated alcoholic solution of Alphanaphthol, to which a few drops of concentrated H_2SO_4 have been added (2 drops per 1 c.c.) produces a yellow precipitate. When the reagent is added in excess, a yellow solution is produced.

Quinidine, Cinchonine and Cinchonidine sulphates, or a solution of their respective alkaloids in dilute H_2SO_4, produce the same color with the Alphanaphthol reagent. So far as the investigation has been carried, no other white alkaloids will give the yellow color.

By means of this reagent the alkaloids of Cinchona have been detected in the presence of several alkaloids, namely, Atropine, Morphine, Cocaine, Strychnine, Caffeine, Brucine, Codeine and Antipyrine.

One c.c. of a solution of Quinine Sulphate (1–2000) was found to produce, with the Alphanaphthol reagent, the characteristic yellow color.

A drop of the reagent, added to the chloroform or ether residues of any of the above cinchona alkaloids produces an intensely yellow color.

SOME "PRESCRIPTION KINKS AND HINTS."[1]

By George M. Beringer, Jr.

The pharmacist might, with profit, stimulate the physicians of his neighborhood to prescribe various coatings for extemporaneously prepared pills. A coating that is easily applied, and, at the same time, is distinctive and unusual, is plumbago. The pills are simply rolled in finely powdered graphite. They may, afterward, be highly polished by rolling on a piece of cotton flannel or of felt.

Physicians are coming more and more to order ointments dispensed in collapsible tubes. The usual methods of filling the tubes are by means of a spatula or by melting and pouring the ointment into the tube before the ointment has quite solidified. The first of these is rather troublesome and "messy." The second cannot be used in very many cases without having an uneven admixture of the ingredients and an ointment far from smooth. The following has been found a convenient, clean and rapid method: The prepared ointment is placed in a thin streak along the center of a piece of suitable paper (preferably parchmentized) about 1¼ times the length of the tube to be filled and about 3 or 4 times the diameter of the tube, in such a manner that the paper and ointment may be rolled into a pipe of slightly smaller diameter than the tube. This pipe is inserted into the tube and the outer end of the paper folded over. The folding-over is continued and the paper withdrawn as the ointment is expressed into the tube. In this way the tube is filled as solidly as by a machine and with little or no loss or smearing.

It has been found difficult to powder chloretone finely enough to make a smooth ointment. It becomes so electrified upon trituration that it sticks to mortars, pestles and spatulas and, when scraped off, flies in every direction excepting the one intended. As it was prescribed in an ointment, for rectal injection, it was not thought advisable to use alcohol or similar solvents to facilitate its incorporation. The substance can, however, be made into a very smooth paste by rubbing upon a tile with a few drops of expressed oil of almond, before incorporating with the other ingredients.

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[1] Read at the annual meeting of the New Jersey Pharmaceutical Association, June, 1913.

Scarlet Red ointment is frequently prescribed in such a manner as to leave the selection of the base for its incorporation to the judgment of the dispenser. Petrolatum is the base most frequently used. The dye, however, is *nearly insoluble* in this medium. It would seem reasonable to suppose that particles of a substance coated with another substance in which they were insoluble would have little or no action upon the tissues with which they were brought in contact. The dye *is* soluble in benzoinated lard and the ointment so made is certainly smoother and probably more efficient.

A prescription was received for soft elastic capsules of oil of erigeron, each containing 3 or 4 drops. It was necessary to add some fixed oil as a diluent in order to fill the capsules satisfactorily. Olive oil, the usual diluent in such cases, formed a cloudy mixture, and, with an old sample of erigeron oil, even threw out resinous masses. Expressed almond oil did the same. Castor oil made a very clear and brilliant solution and was used with satisfaction.

The following prescription for an injection seems simple, but illustrates how a very slight difference in manipulation may make considerable improvement in the finished product.

℞
Tr. Opii ....fl. dr. 1.
Tr. Catechu Co..........fl. dr. 2.
Plumbi Acetatis .... gr. 15.
Zinci Sulphatis .... gr. 15.
Aquæ Rosæ qs. ad.......fl. oz. 8.
M

This was at first prepared by adding the Tr. Opium and the Comp. Tr. Catechu to the other ingredients—previously mixed "secundum artem." It was found, however, that the precipitate subsided very rapidly and, with some specimens of Comp. Tr. Catechu, was granular. The following method proved better: The Tr. Opium and the Comp. Tr. Catechu were mixed with 4 fl. ozs. of the Rose water, the other ingredients mixed secundum artem with the balance of the Rose water and the two solutions mixed. By the latter method the ppt. was more bulky and more finely divided, hence, subsided more slowly and could be more evenly administered.

The well trained pharmacist is exceedingly careful, when triturating two powders, to add very slowly and cautiously the diluent powder to the more active; yet, very often, the same person fails to realize the importance of observing the same procedure when triturating an insoluble powder with a liquid. Two samples of the following prescription illustrate the importance of this:

℞

Calaminæ	gr. 40.
Zinci Oxidi	dr. 2.
Liquor Calcis	fl. oz. 4.

M

A sample, prepared by adding the lime water in considerable quantities at the start, although triturated for a fairly long time, commenced to subside immediately after being shaken up. Coarse particles could be readily seen in the mixture.

A second sample, prepared by adding the lime water in small amounts and triturating after each addition till a perfect magma was formed, had scarcely commenced to precipitate five minutes after being shaken. The particles were apparently evenly divided, and after final separation, on long standing, the precipitate was twice as bulky as that in the first specimen. It is easy to imagine which sample could be most evenly applied and would give the most benefit when applied to the skin.

The following formula presents a unique difficulty:

℞

Kaolini	oz. 4.
Glycerini	fl. oz. 1.
Sod Salicylatis	dr. 2.
Ol. Eucalypti	fl. dr. 4.
Ac. Borici	gr. 50.
Ol. Gaultheriæ	fl. dr. 2.
Mentholis	gr. 40.
Lanolini	oz. 2.

M

This was prepared by rubbing the Kaolin, Boric Acid, Sodium Salicylate and Lanolin together in a mortar, incorporating the Oils in which the Menthol had been dissolved, and, finally, adding the Glycerin. The result was a granular mass mixed with what appeared to be streaks of oil. However, the oils had been perfectly incorporated before the Glycerin had been added; also, previous experience had taught that alcohol and some other liquids would not mix with Lanolin until diluted with sufficient Water. Hence, a fl. ounce of Water was added and well stirred in, when the mass became a perfectly smooth cataplasm.

THE PHENOMENA OF CATALYSIS.[1]

REMARKABLE RESULTS PRODUCED IN CHEMICAL REACTIONS BY THE MERE PRESENCE OF CERTAIN SUBSTANCES WHICH UNDERGO NO PERMANENT CHANGE.

By W. R. Whitney.

This is a purely chemical term and stands for the process of greatly increasing the velocity of chemical reactions by employment of materials which are not consumed in the process. Any analogy is apt to be misleading, but Ostwald suggests the parallelism between catalysis in chemistry and the effect in mechanics of the change from a too thick to a good lubricating oil on a shaft rotating under constant force. The speed will increase without application of additional energy. In a sense, this definition is too academic. In most of the processes called catalytic, the velocity-increase is so enormous that, without the catalyzing agent, the process would hardly take place at all. For this reason a catalyst is sometimes defined as any substance which *produces* a chemical action without being consumed in the process.

Catalysis is usually limited to describe cases where a definite material, or even a definite form of material, seems to bring about a reaction or produces a great increase in the velocity of the reaction. Heating the reagents produces great increase in velocity of most chemical reactions, and some are made to speed up by the effect of light, and so heat and light are sometimes called catalyzers But it is customary to consider this type as at least partially understood and to class under catalysis the less easily explained cases, where the mere presence of some *material* apparently does the work and is yet not consumed. It acts more like the trigger of a gun. This sets off the reaction, which in our gunpowder analogy would otherwise be an exceedingly slow oxidation. The gunpowder might take a century to oxidize unless it were set off, although the products of the reaction would be the same regardless of the velocity.

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[1] Reprinted from *Sciences Conspectus,* 3, 1913, pp. 84–88.

It is very probable that for years catalysis was a word used, as such terms are often used, to classify or group together, without further commitment, a number of different phenomena which were not at the time explicable. It was known that hydrogen and oxygen could be mixed and would remain inert indefinitely, but that a little platinum or an electric spark in the presence of the mixture would cause rapid combination to form water. A finite quantity of platinum was able to produce the reaction between an unlimited quantity of these gases. Other finely divided metals acted similarly. The platinum was called the catalyzer. The spark in such a case was not usually considered as a catalyzer in the narrower sense. This is probably because the case is an application of intense heat which in any other manifestation is equally efficacious. It has been the custom to consider as cases of catalysis only those reactions in which the phenomenon can be ascribed to some material, thus excluding greatly increased reaction velocity due to light, high temperature, etc. It was known, on the other hand, that the decomposition of hydrogen-peroxide solution was greatly hastened or made almost instantaneous by colloidal platinum and other colloidal metals. Here again the metal was not consumed and had not lost any of its power after it had apparently accomplished so much. It was known that sugar in aqueous solution is ordinarily decomposed by the water into dextrose and lævulose with exceedingly low velocity, but the same reaction takes place very rapidly in presence of acids or certain organic ferments. Thus the acid and the ferment were called the catalyzer.

It is known that many of our most common chemical reactions owe their velocity to the presence of water. In fact, water is the most common and most important catalyzer of all. It is much easier to find cases of chemical reactions which need water for any appreciable velocity, than it is to find reactions which can proceed in its absence. Yet in most of them the water apparently does not take part in the reaction nor is lost through it, and the same water could be used to an unlimited extent. Practically all of the common chemical reactions are of this type. Silver nitrate and sodium chloride do not react in the dry state, and the mere condition of solution is also not a criterion. While these two react readily when dissolved in water, they need not react appreciably when dissolved in some other solvent. This catalytic action of water, so common as to be usually lost sight of as a case of catalysis, is a very marked case because of its sensitiveness. The most refined methods have had to be employed to remove the water in cases where its effect was to be studied. For example, the ordinary explosion of carbon monoxide (CO) with oxygen does not take place if the gases are perfectly dried, but a trace of moisture makes it easy to start the reaction by a spark. Such active agents as gaseous hydrochloric acid and ammonia, which combine readily at ordinary temperatures, do not react in entire absence of water. And the decomposition or dissociation of ammonium chloride which in any ordinary experiment is readily brought about by moderate heating, will not occur in absence of traces of moisture.

The method of action may not be the same in these various cases, but the resulting great increase in velocity of action or even apparent production of the possibility of reaction and the non-consumption of the foreign matter or catalyst is common to them all. There are many other such reactions.

The various types of catalysis apparently differ widely, and while they possess in common the peculiarity which coördinated them under this head, they are being subdivided and grouped under new classifications because differentiating characteristics become gradually better understood. For example: there is a large group of chemical processes which are catalyzed by the presence of solids; sometimes by a specific solid, such as platinum, in other cases by a particular state or property of a solid, such as fine subdivision or large surface area, etc. A little palladium or osmium will ignite illuminating gas at the burner-tip in air. Some platinum, vanadium oxide, or even iron oxide will bring about the rapid union of sulphur dioxide and oxygen. These may be classed as surface effects, as absorption effects, etc., while it is not probable that reactions which owe their procedure to liquid or gaseous water can be so classed.

A number of catalyses may be looked upon as being due to the formation, for a short time, of products containing the catalyzer and one or both of the reacting substances, the catalyzer later stepping out of the reaction at its completion, much as the marrying parson leaves the wedding ceremony with his marrying power undiminished. In such cases it seems necessary to grant that the time necessary for the catalyst to unite with one of the reagents, and for the second to enter the reaction and the catalyst to back out, so to speak, is in all shorter than the time necessary for direct union of the reacting substances. This is possible. The catalyst often seems to be merely a means of in some way reducing the delays in a process. It can hardly be said to reduce the resistance to reaction, for reduction of resistance should cause a change in the total heat evolved by the reaction, and this does not occur.

Any treatment of this subject would be incomplete which did not mention the phenomenon of anti-catalysis or negative catalysis. As the name implies, this is the case where the presence of some otherwise inactive substance retards or prevents a reaction which would otherwise take place. In biological chemistry there are many such cases, and they are frequently referred to as poisonings. One of the best known inorganic cases is that described by Bredig, who found that while the decomposition of hydrogen peroxide was catalyzed by colloidal platinum, iridium, etc., the presence of almost any one of the common soluble poisons was capable of destroying the action of the catalyst and of preventing the reaction. Hydrocyanic acid, hydrogen sulphide, arsenic, copper salts, etc., are such poisons. These poisons also act as anti-catalyzers to a number of biochemical reactions, ferment actions, etc. Water in most cases is an active catalyzer, but a few cases have been found where it is distinctly an anti-catalyst. Oxalic acid, dissolved in dry sulphuric acid, decomposes very rapidly, but the presence of traces of water greatly diminishes the velocity. The hydrogen ion is a generally active catalyzer. It shows its power in many cases of hydrolysis and in the action of enzymes, etc. The hydrolysis of cane sugar by acids depends upon it.

A multitude of reactions for which solid catalyzers have been found may be represented by one or two specific cases. Ammonia and alcohol vapors combine rapidly in the presence of heated thorium oxide, so also do phenols and alcohols. Titanium oxide and other metal oxides catalyze organic reactions without there appearing to be any predeterminable predilection. One is led to imagine that every possible chemical reaction has its specific catalyzers. Haber has said that every solid substance exerts some accelerating action on gaseous reactions, though some do it much more markedly than others.

It may be that all cases of catalysis are to be looked at as brought about either by the formation of intermediate chemical compounds of the catalyzer with one or both of the reagents and the subsequent breaking down of such compounds to the final reaction products, or of physical adsorptions corresponding to the increasing of concentration of one or more of the reacting substances.

The chemical industries are full of the most interesting and successful catalyses. Sulphuric acid manufacture has always made use of catalyzers in some form. In the early days it was the nitrogen oxides, and now it is platinum sponge, etc. When sulphur is burned in air, or oxygen, the dioxide is produced, and this, even in the presence of excess of oxygen, does not seem inclined to continue in the process of oxidation to the state of trioxide at any measurable rate. Yet this is the direction it should proceed, and any one of several triggers or catalyzers will effect it. It is very important to note that the final state of all of these catalyzed reactions is the "natural" state; that is, no consumption of energy is needed to reach the state, and energy is evolved by the process. The sulphur, in burning, *tends* to become the trioxide. Under normal conditions it only reaches the dioxide state in measurable time, but contact with such a solid as platinum sponge will catalyze the reaction, thus producing with great rapidity sulphur trioxide (the anhydride of sulphuric acid).

The great German dye firm, the Badische Analin u. Soda Fabrik, made careful study of catalyzers for the reaction between hydrogen and nitrogen by which they hoped to and finally did make ammonia commercially. The reaction was a perfectly possible one, but without catalysis it was always too slow to be practical. Finely divided iron, manganese, molybdenum, and tungsten were all found to be effective, and it was further found that these catalyzers could easily be poisoned by some reagents, but could be benefited by others. Thus arose the term "promoters" in catalyzers. A small quantity of some substance, such as an oxide, for example, serves as a promoter to the catalytic action of iron on the ammonia synthesis. Thus a practical and commercial process for direct synthesis of ammonia has been brought about. This reminds one somewhat of the complements and the immune bodies which, while cooperating in the blood, produce the effects of immunity.

There seems to me to be one simple way of looking at all catalyzers which is useful if it be not used unfairly. The velocity of reactions depends on the concentration of the reacting particles (molecules or ions, or whatever they may be). It is not difficult to find in all cases of catalysis the probability of an increased concentration which is attributable to the catalyst. This is plain in such a case as platinum sponge and surface or solid catalyzers, for the absorption and adsorption of gases in such cases are well known. It is only a step along the path of this illustration to see possible intermediate physical and chemical compounds as concentrations of one or both of the reagents. Solid thoria catalyzes many organic reactions, so also does dissolved aluminum chloride. In the former case the physicist would grant the formation of adsorption compounds, and in the latter case the chemist recognizes the temporary formation of intermediate chemical addition products with the aluminum chloride. If we look at these two cases as cases of increased concentration of the reacting reagents, the possibility of coördination is clear.

The reactions in living matter (plant and animal) are very commonly catalyzed. Many of the catalysts have been named and have been isolated in more or less pure form. Malt diastase, which brings about the dissolving or hydrolyzing of starch, is such a catalyst. By its action in the germinating grain or seed, the reaction of the break-down, dissolution or solution of the starch is made rapid. The starch would be useless without this catalyst, and it is not used up by the reaction. This process is not confined to the cell or seed. It may be carried out in the laboratory. For example, a large mass of nearly solid starch paste may be made to rapidly liquefy by the introduction of a very small quantity of diastase. The enzymes ptyalin, invertin, emulsion, pancreatin, pepsin, and a score of others, are quite analogous. They each catalyze some reaction characteristic of some living process. Albumen and similar albumenoid matter is rendered soluble or assimilable by the catalytic action of pepsin, for example. The reaction is not a simple one between the pepsin and the albumen, but the latter causes the albumen to react with the water present and hydration occurs. A perfect explanation of this catalysis in life-reactions is probably not yet possible, but in looking for analogies of our apparently simpler cases, we are struck with the force of the fact that these digesting catalysts are known to absorb on, or absorb in the organic matter whose dissolution they catalyze. For example: if fibrin be suspended in gastric juice (which contains some of these organic catalyzers or enzymes), it can be shown that they leave the solution and are absorbed by the fibrin in which they are producing the decomposing reaction. They thus resemble the reacting gases which adsorb in the platinum of our simpler cases.

An exceedingly interesting recently investigated case of catalysis in the relatively simple reactions of the laboratory, corresponds so perfectly to a well known and apparently complex historical case in Nature that I make bold to present it.

It may be recalled that in that remarkable biochemical work of Pasteur's in connection with a study of the tartrates, he found that in the crystallized tartaric acids there were left and right crystals, shapes which corresponded as our left and right hands do and would not permit of even imaginary superposition. So also, when these were in separate solutions, one caused rotation of the plane of polarized light to the right, and the other to the left. When they are suitably mixed they form the optically inactive racemic acid. One of the ways, which he discovered for separation of these two forms when found thus mixed in Nature, was by means of the green mould *Pencillium glaucum.* The growth of this mould caused decomposition or destruction or oxidation of one of these exceedingly similar chemical compounds (identical in quantitative chemical composition) more rapidly than the other; it showed such a selective catalysis as to distinguish between the two. This was a case of selective catalysis by the enzyme or ferment of the growing mould. Starting with the racemic, or optically inactive acid, he could stop the fermentation at a stage where only the lævo tartaric acid remained, the dextro tartaric acid having been destroyed.

Now quite recently, Bredig and his pupils have studied the reaction of decomposition of bromcamphorcarbonic acid when catalyzed by small quantities of organic bases such as the alkaloids. They seem to have thus produced results very perfectly paralleling the above historic discoveries of Pasteur.

The molecular structure of the tartaric acids is such that, knowing this structure and knowing that an asymmetric carbon atom will produce optical activity, it is now possible to predict such developments as the separation of some optically inactive material into two optically active ones. It was shown that in the decomposition of bromcamphorcarbonic acid, the organic alkalies act as catalyzers. This substance decomposes slowly into bromcamphor and carbonic acid. The process is catalyzed by organic alkaline bases, such as analin. The bromcamphorcarbonic acid has two optically active forms corresponding to the left and right tartaric acids of Pasteur. Both of them are catalyzed equally by optically inactive bases, but one of them is more rapidly catalyzed than the other by chinin as catalyzer, and the other is more rapidly catalyzed by chinidin than the one. Chinin and chinidin are themselves optically active substances, and thus it is found that an optically active catalyzer is capable of differentiating in catalysis between two optically active compounds and can catalyze the decomposition of one of them more than that of the other in a mixture of both, as Pasteur found with *Pencillium glaucum* and the tartaric acids.

HOW TO STUDY MEDICINE.[1]

By Henry S. Pritchett,
President of the Carnegie Foundation.

To-day there are some hundreds of thousands of young men and youths in our country who are thinking more or less seriously of adopting some profession, and many thousands of these are looking toward the profession of medicine or surgery. Hundreds of others will be attracted toward that profession by the advertisements of medical schools, for medical advertising is a business in our country. A large number of young men who are clerks in country stores or assistants in railway offices have been led to undertake the study and practice of medicine as a result of the alluring inducements held out by these advertisements, inducements which paint the life of the physician and surgeon in glowing colors and the receipts from professional fees in the most optimistic vein.

The spectacle which this presents—that is to say, the spectacle of men being led into a profession so serious and important as that of the physician and surgeon by the mere influence of an advertisement—is something which one cannot see in any other country. It exists in the United States because of the excessive number of medical schools in this country and the resulting competition for students. There are nearly as many medical schools in the United States as in all of the rest of the civilized world put together. These medical schools in some instances are splendid institutions abreast of the science and the practice of the day, such as those of the Johns Hopkins University, of Harvard, and of Ann Arbor. But the majority are proprietary schools—that is to say, schools which are owned by an individual or by a group of individuals, and which depend for their continued existence upon securing a considerable number of students. This solicitation is made in most cases through advertisements which are intended to catch the eye of the boy or the young man who is tired of his present job and is anxious to find another.

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[1] Reprinted from *The Outlook,* Oct. 1, 1910, pp. 272–275.

The consequences of this overmultiplication of medical schools striving to get students has resulted in a great overproduction of physicians and surgeons. There are more physicians to-day in the United States to each ten thousand inhabitants than in any other country in the world; and, unfortunately, the vast majority of these men have had no adequate preparation in their profession, and a very large proportion of them have gone into it with little conception of its obligations and its demands. As a result, the living which the average doctor is able to make is a meagre one, and in the little towns of two or three thousand inhabitants, where ordinarily one finds from five to ten physicians, the practitioner can expect only a bare living. The situation is one calling so strongly for improvement, and one in which the youth who goes into the profession is so often the victim of false representations, that I venture to state a few of the preliminary facts which the young man who is looking toward medicine ought to take into account.

First of all, no young man who is thinking of the profession of medicine should allow himself to be influenced by the commercial argument. Medicine is a profession, not a business, and the man who goes into it, whether he gain a large practice or a small one, must give out much more than he receives, not necessarily in money, but in effort and sympathy and sacrifice. The man who is seeking a business which will bring him money should look elsewhere.

Second, no man, whether young or of more mature age, should choose a school in which to study medicine through an advertisement. You may be sure that the institution which seeks to secure your attendance as a student through alluring advertisements is in every case a bad place for study, and that the very fact of these specious advertisements is a proof of its weakness and incompetency. If you have decided to study medicine, find out from the best-informed physicians of your neighborhood where medicine may be rightly studied, but do not make, in any case, your decision from the advertisements or the solicitations of the medical schools themselves.

Furthermore, the boy of this generation who looks toward medicine must understand that medicine has almost been made over in the last twenty years. To-day the practice of medicine rests upon the application of certain fundamental sciences, many of which have had their development in these last two decades. For example, physiological chemistry, the chemistry which undertakes to deal with the processes of digestion and of assimilation, was hardly known as a practical science twenty years ago, but to-day it is playing a most important rôle in the equipment of the rightly trained physician. The men who graduated twenty-five years ago from the medical school had never made a culture of bacteria. To-day no man can practice medicine without day-by-day examinations of the by-products of the human body. In a word, the medical and surgical practice of our day is nothing other than the application of those fundamental sciences—physiology, anatomy, bacteriology, physiological chemistry, and the like—which deal with the functions and the construction of the human mechanism. Therefore, any man who is to practice medicine in the future must have a grounding in these sciences, and a thorough one.

All this has brought it about that the physician of this generation must be not only grounded in the technique of these fundamental sciences, but he must be an educated man as well. If you are clerking in a store, or keeping books in a railway office, or traveling for some commercial house, and have come, through one means or another, to consider medicine as a calling, don't imagine for a moment that you can be a successful and rightly fitted practitioner of medicine without a good general education, and, if you are in earnest about your profession, you will go to work to get this general education first before undertaking the other. The day of the uneducated doctor is past, except as he is able to impose his practice upon people who do not know what they are entitled to have in the way of medical treatment.

Above all, do not let yourselves be misled or deceived by the plea put forward by the commercial medical schools, that they are to serve the poor boy. This assumes that the poor boy is in some way or other to be got into the practice of medicine without complying with the requirements for that profession which other boys are to submit to. On the face of it, this is a concession to the poor boy. As a matter of fact, it is not only an insult to his intelligence, but its real purpose is to serve the weak and ill-prepared medical schools which can live only by drawing to their doors a mass of uneducated and unfit men, the great majority of whom are turned out from these low-standard institutions at the end of one or two years. The fact is that a poor boy has no right to go into the practice of medicine with any lower qualification than the rich boy. The practice of medicine is one of the great human professions which affect profoundly not only the health but the moral and social lives of a community. No man has a right to go into it unless he will fit himself fairly for the work. Educational opportunities in America are to-day so generous that any poor boy with the right stuff in him who desires to enter medicine can secure, not only the necessary medical education, but the requisite general education. It is only a question of his persistence and his courage and his energy; and the young man who allows himself to be persuaded into the profession by the advertisement of some school which offers to provide a short cut for the poor boy may feel sure that in the end he will find himself in a profession in which he will be utterly outclassed and in which he can obtain only such practice as may not be desired by the competent practitioner.

To-day the medical colleges of the country are graduating many more physicians than can possibly find places for a fair practice. Little towns which could support in comfort two competent practitioners are called upon to support half a dozen, and this means usually a half-dozen incompetent men. The boy who is looking toward medicine may well take these facts into account, and fairly face the further fact that, unless he has a good education and unless he will go to a well-equipped medical school, he can have no real opportunity for a useful and satisfactory life in this profession in the future. As to which medical schools are prepared to teach medicine in the modern way, the medical student who is in earnest can learn from any well-informed practitioner in his own neighborhood. Only let him be sure to get his advice from some man who knows the medical teaching of the last two decades, not from one who makes his recommendations from his recollections of the didactic medical teaching of twenty-five years ago.

There is one other word which the man who has to do with education—and this is quite as much a question of education as it is of medical practice—feels he must say to the future practitioner, and that is a word concerning the matter of medical sects. It is a very common thing to find the young candidate for medicine more concerned over the question whether he shall be allopath, homeopath, eclectic, or osteopath than to find him seriously inquiring as to the nature of the instruction he is to seek. This is partly due to lack of information concerning the modern training in medicine, and partly to the fact that a large number of men are entering the profession from the standpoint of a commercial, not from the standpoint of a professional, career, whose chief attraction to the true physician lies in the opportunity to serve humanity.

Now, the question of medical sects is a difficult one to deal with, even for an outsider, and I do not intend for a moment to urge one or the other of these sects upon the consideration of any young man. I wish only to call his attention to this fundamental consideration which he generally loses sight of. Whether a man call himself an allopath, a homeopath, an osteopath, or an eclectic, he is going to be called upon to diagnose and treat the same diseases. In a little Western town a hundred miles from a railway I have seen a man who had spent two short winters in an osteopathic establishment undertake to diagnose appendicitis, rheumatism, adenoids, various diseases of children and of adults, and to treat them all by one mechanical process. In other words, whether a man calls himself by one name or another, he must know those fundamental sciences upon which medicine rests, and these are just as necessary for one medical sect as for another. The man who thinks that he can prepare himself for a rapid medical practice by joining one sect rather than another is not only getting ready for a bitter disappointment, but he is getting ready also to do the gravest kind of injustice to the people upon whom he seeks to practice, since he undertakes to deal with the very questions of life and death without having prepared himself in any fair way to know what those issues are or how to deal with them. Whether you undertake to be one thing or another, do not for a moment forget that this fundamental study and preparation is absolutely necessary if you are to be an honest man as well as a practicing physician.

I venture, therefore, to urge every young man who has in mind the practice of the noble profession of medicine to face the requisites of that profession before he embarks on it, to get a fair general education before he begins his professional education, and to understand clearly that he cannot get a modern medical education in a proprietary, advertising medical school which lives on the fees of its students, even if that school finds shelter under the charter of a well-known college or university.

THE GEOGRAPHIC DISTRIBUTION OF TANNIN PLANTS.[1]

By W. W. Stockberger,[2]

Bureau of Plant Industry, U. S. Dept. of Agriculture.

The constant increase in the quantity of tanning materials which is being imported into the United States cannot fail to arouse further interest in the source of these products and in the economic conditions prevailing in the countries from which they are derived. Since in recent years important additions have been made to the number of plants recognized as available sources of tannin, further knowledge regarding their abundance and general region of occurrence is naturally very desirable. Also much more definite information is needed concerning the local distribution and commercial range of all important tannin plants before either their economic significance or their practical importance as an available source of tannin for trade uses can be fully determined.

The limits of this brief and general paper will permit the mention of only a few of the salient features of the distribution of tannin plants, with very little discussion of this subject in its practical aspects, although the latter are yearly growing in importance. The significance of certain facts respecting the geographical distribution of tannin plants can perhaps be more fully appreciated if some consideration is first given to the distribution of tannin in the various natural orders and families into which plants have been grouped with respect to their relationships. This is a subject which has received very little attention except for the contribution of Dr. Dekker[3] in his invaluable monograph on the tannins, which has been freely drawn upon in the preparation of this paper. In Dr. Dekker's work the results of his own extensive researches are so combined with those recorded in the widely distributed literature of the tannins that the whole presents a mass of data from which important generalizations may be made. However, since the number of plants in which the presence or absence of tannin has been determined is relatively small in comparison with the number of known species of plants, it is very probable that these generalizations will be more or less modified by future investigations.

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[1] Reprinted from Journal of American Leather Chemists Association, January, 1913.

[2] Read at the A. L. C. A. Convention, Washington, Dec. 5, 1912.

[3] Dekker, J., "De looistoffen," Bulletin van het Koloniaal Museum te Haarlem, No. 35, 1906.

When the groups or subdivisions into which botanists divide the plant kingdom are considered with respect to the occurrence of tannin therein it appears that some forms of this compound appear in all of the main groups of plants, but that in every group there are many families that contain little or no tannin. In the lower groups of plants represented by the algæ, fungi and lichens, tannin is of frequent occurrence but owing to the relatively small mass of plant material furnished by these groups the total quantity of tannin produced is not sufficient to have any commercial importance. In the next group, the mosses, very few plants have been found which give a positive reaction for tannin. The group which includes the ferns has numerous species which vary in tannin content from a mere trace to as much as 10 per cent., but it is in the higher group of seed-plants that tannin occurs most abundantly.

The subdivision of seed-plants, known as the Gymnosperms, contains a large number of plants which have a high tannin content. The most important of these are species of trees such as the pine, hemlock, spruce and fir. On the other hand among the Monocotyledons the number of families in which tannin has been found is small, and of these the Palmæ is the only one in which there are plants which furnish tannin in commercial quantity. Among the hundreds of species of the families which include the grasses, sedges and lilies, the occurrence of tannin even in very small quantities is quite rare.

The last and most important division of the seed-plants, the Dicotyledons, furnish by far the largest number of plants rich in tannin. The respective natural orders comprising the Dicotyledons vary greatly, as has been pointed out by Dr. Dekker, in respect to the manner in which tannin is distributed among the various families. In every order it frequently occurs that of two closely related families the plants of one will be rich in tannin while in the plants of the other, tannin will occur either in very small quantities or not at all.

Occasionally there seems to be a gradual variation in tannin content between closely related families. Some natural orders contain no families of plants at present known to produce tannin, and in other orders almost the entire range of families furnish plants containing tannin but in very limited quantities. From the information which is at present available it does not seem possible to establish any very direct correlation between the production of tannin by different families of plants and their relationship to any of the schemes of classification which are in use by modern botanists. Since, however, most of the known facts concerning the distribution and abundance of plants have been collected and arranged with reference to the botanical classification it will be desirable to recognize the usual divisions into orders and families for the purpose of more clearly setting forth the general facts concerning the geographical distribution of plants producing tannin.

Turning now to the actual question of geographical distribution of plants producing tannin, we may at once dismiss from consideration all of those families in the previously mentioned classification other than the seed-plants. We will consider for convenience of discussion each of the three main groups of seed-plants, beginning with the Gymnosperms. In this subdivision practically all of the plants known to contain tannin occur in one of four natural orders, the chief of which is the Pinaceæ, to which belong the pines, spruces, hemlocks and firs. The distribution of this group in the northern hemisphere naturally follows closely that of the coniferous forests and aside from the occurrence of a species of *Podocarpus,* in Southern Africa, and a species of *Phyllocladus* in Tasmania and New Zealand, there are no important tannin-bearing representatives of the Gymnosperms to be found south of the Equator. The distribution in the Northern Hemisphere coincides in a more or less general way with the principal mountain ranges, the slopes of which are naturally wooded with forests of coniferous trees. This of course tells nothing of the distribution in detail but merely indicates the densest areas on which plants of this group, having a high tannin content, may be found. Scattered generally throughout certain sections of the United States and Mexico, as well as through regions in Central and Northern Europe and Asia, are many tannin-bearing species which belong to this group, but since by far the largest number of important species are included among either the pines, hemlocks or spruces, it follows that the general distribution of this group of tannin plants conforms quite closely to that of these species of trees. So far as known it appears that the tannin-bearing Gymnosperms are practically confined to the north temperate zone, and because of their accessibility and the inroads made upon them in order to meet the increasing demands for timber it is probable that this source of tannin will be one of the first to be exhausted.

The second group of seed-plants, the Monocotyledons, is quite unimportant from the standpoint of tannin, although it contains many hundreds of species of plants which are well known and widely distributed. Here, as was stated, belong the grasses, of which there are more than 3,500 varieties, but only four or five of these are known to contain tannin. In the one order which contains all of the tannin plants of importance, two only are worthy of mention here. These are the palmetto of Florida and *Areca Catechu* of India, which is one of the commercial sources of cutch. There are 35 other orders in this group, the plants of which are widely distributed, but they are so poor in tannin that from the commercial standpoint at least they cannot be regarded strictly as tannin plants.

The third group of seed-plants, the Dicotyledons, contains by far the greater number of tannin plants. In some of the natural orders of this division tannin producing families are practically wanting, in some the relative number of tannin families is variable, and in others practically every family contains tannin producing plants. A study of those natural orders in which only a part of the families contain plants rich in tannin reveals some interesting facts. Several of these orders are widely distributed both with respect to climatic conditions and continental location. Representative species which contain tannin occur in various situations ranging from the tropics to areas approaching the limits of vegetation toward the poles. However, when the locality is considered, of such plants as have been found to yield tannin in percentages sufficient to make them commercially promising, it becomes evident that with few exceptions they are all to be found in tropical countries. This fact may be concretely illustrated by citing the distribution of some of the more important tannin plants belonging to those natural orders in which there is great variation between families with respect to tannin production. For example, the natural order Urticales has three tannin producing families comprising about sixty species of plants of which those highest in tannin, 4 to 14 per cent., are a few species of *Ficus* growing in India and the Philippines. In the order Santalales four families together contain about fifteen species of plants which produce tannin, the important ones being species of *Osyris* and *Fusanus* from India, Central Africa and Australia, ranging from 15 to 25 per cent. in tannin content. The order Ranales has nine families which together include a hundred species of plants containing more or less tannin; of these the best known are species of *Persea* in Chili, 17 per cent. tannin; *Nectandra* in Brazil, 10 per cent. tannin; *Nesodaphne* in Australia and *Litsea* in India, both yielding over 7 per cent. tannin. In the order Tubifloræ a large number of tannin containing species is distributed among fourteen families. The important tannin plants are species of *Bignonia* from Guiana, 14 per cent. tannin, of *Eremophila* from Australia and of *Avicennia* from the East and the West Indies. Other orders in which a part of the families have numerous species containing tannin, the important ones of which are largely confined to the tropics, are the Contortæ, Aristolochiales, Rubiales, Umbelliflora, Parietales and Malvales.

No less interesting is the distribution of those orders in which practically all the families comprise tannin bearing plants. In some of these families the occurrence of tannin is so general that they may be considered as typical tannin families. Examples of such are the Combretaceæ, consisting of about 240 tropical species, one of which yields the myrobalans of commerce; the Rhizophoraceæ which contains about 50 tropical species rich in tannin, some of which yield the mangrove bark; the Leguminosæ with about 6,000 widely distributed species of which many of those rich in tannin, as the wattle, algarobilla, ratanhia, kino and divi-divi, are tropical, and the Myrtaceæ which has at least 100 tannin species, the best known of which is the Eucalyptus, native of Australia. Notwithstanding the wide distribution of these families, by far the greater number of species having a high tannin content occur in tropical or subtropical regions. There are, of course, some exceptions, as, for example, the Fagaceæ, to which the oaks and chestnuts belong, but in general that portion of the several continents lying between the parallels of 30° north and south latitude must be depended upon to furnish the bulk of the supply of commercial tannin.

An enumeration of the various plants which have been used for tanning in different countries would give only an apparent indication of their geographic distribution, since a tannin plant frequently occurs in countries where it finds little if any use and perhaps more frequently its greatest use is in countries where it does not naturally occur. In many cases it is equally unsafe to judge of the botanical distribution of these plants from the localities given as the source of the material used in the analyses reported in the literature of the tannins. The writer recently examined what purported to be a list of the most important tannin plants of the world in which the country where each species occurred was given. On tabulating this list the following distribution of the species was obtained:

India	68 species	Chili	3 species
Europe	40 species	Brazil	3 species
Australia	22 species	Argentine	3 species
North America	16 species	New Zealand	3 species
Africa	9 species	Peru	2 species
Central America	7 species	Guiana	2 species
China	3 species	Asia	2 species
Japan	3 species	Mexico	1 species

A number of reasons might be given for the apparent inequality in distribution shown by this compilation, but it will suffice to say that botanical exploration, particularly with respect to economic plants, has been carried much further in India and Australia than in other tropical countries, and that when these countries shall have been fully explored substantial additions will probably be made to their lists of tannin plants. In this connection mention may be made of a note by the writer in the JOURNAL of this Association [4] in which attention is called to thirty-five species of tannin plants in Paraguay, only one of which is referred to Paraguay in most of the literature on tannins.

The present state of knowledge with respect to the distribution of tannin plants leaves much to be desired. The lack of information is not confined to the conditions in the less accessible tropical countries alone, but is evident also wherever it becomes desirable to secure full details concerning the production, handling and utilization of any tannin plant. In the judgment of the writer there is less need for concern regarding the possible exhaustion of the natural supply of tanning materials than for a practical solution of the problem of how to bring them into the market on terms that do not work a hardship either to producer or to consumer. So long as these materials can be obtained from untilled or untillable areas of land with the assistance of low priced labor their production as an agricultural crop will probably be very limited. But should economic conditions so change as to enable certain tannin plants to compete successfully with general field crops there is no doubt that large quantities of tanning materials could then be produced on an agricultural basis. It follows, then, that the practical importance of a thorough study of the geographic distribution of tannin plants is two-fold, first, since it will yield more definite information concerning the location and available quantity of existing tannin materials, and second, since it alone can furnish a rational basis for extensive experiments having as their aim the introduction of tannin plants into our present system of agriculture.

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[4] Stockberger, W. W., Tannin Plants of Paraguay, *Journal of the American Leather Chemists Association,* April 1912, p. 185–192.

PHILADELPHIA COLLEGE OF PHARMACY.

Semi-Annual Meeting.

The semi-annual meeting of the Philadelphia College of Pharmacy was held September 29th at 4 P.M. in the Library, the President, Howard B. French, presiding. Twenty members were present.

The Minutes of the quarterly meeting held June 30th were read and approved.

The Minutes of the Board of Trustees for June were read by the Registrar J. S. Beetem, and approved.

The report of the Committee on Nominations was read and ordered entered and filed.

The report of delegates to the meeting of the American Pharmaceutical Association held at Nashville, Tennessee, August 18–23, in the absence of the Chairman, Professor Remington, was presented by Professor Lowe. A further report was also read by Professor Kraemer.

Professor Lowe said that the sixty-first annual convention of the American Pharmaceutical Association was held in Nashville, Tenn., August 18–23, 1913. The college was represented by the following: Jos. P. Remington, Geo. M. Beringer, E. F. Cook, Joseph W. England, Henry Kraemer, Adolph W. Miller, Clement B. Lowe, F. X. Moerk, and F. P. Stroup. A few of the Eastern delegation went to the meeting by way of Cincinnati in which city they were delightfully entertained by the local pharmacists headed by Professor John Uri Lloyd.

In regard to the meeting Dr. Lowe said that one very practical suggestion of President Day was that the secretaries of the different State Pharmaceutical Associations be invited to meet at the annual convention of the A.Ph.A. to discuss practical plans for increasing the efficiency of the state associations. He also commented on the work which was done at the meeting but as an extended account has already appeared in this JOURNAL for September, the report is not given in further detail. Among the officers of the association for the ensuing year are several members of the college including George M. Beringer, President; Franklin M. Apple, First Vice-President; and E. Fullerton Cook, Chairman of the section on Pharmacopœias and Formularies.

Professor Kraemer read a somewhat extended report on the problems connected with pharmaceutical education which were presented at the Nashville meeting. The purpose of this report, as was stated, was to crystallize out in some concrete form not only the nature of the work which was done but to indicate what was thought should be the proper attitude of the college in regard to the various questions which require more or less immediate attention.

In regard to the alumni dinner at the Hotel Maxwell Professor Kraemer said that this was among the most pleasing events of the meeting. It was an occasion which served not only to unite our members but to show the members from the various sections of the country that each one had a duty to perform if the college was to maintain its prestige and reputation. Our Dean, Professor Remington ('66), presided and brief speeches were made by nearly all of those in attendance. Among those present may be mentioned Dr. John F. Hancock, Professor J. U. Lloyd, Professor C. Lewis Diehl, Professor J. M. Good, Dr. Adolph Miller ('62), Dr. F. E. Stewart ('75), W. P. Porterfield ('78), William Mittlebach ('79), George M. Beringer ('80), F. A. Miller ('83), J. W. England ('83), C. B. Lowe ('84), Frank X. Moerk ('84), E. G. Eberle ('84), J. Fred Windolph ('85), C. A. Mayo ('87), E. V. Howell ('89), H. V. Army ('89), Henry Kraemer ('89), John Culley ('94), Irvin A. Becker ('95), F. P. Stroup ('96), E. F. Cook ('00), H. Lionel Meredith ('00), C. P. Greyner ('96), I. Curtis Arledge ('12), Joseph Rosin.

The several reports were discussed by Messrs. Beringer, French and Lowe and then ordered entered and filed.

The Committee on Membership reported favorably on the application of Mr. Elmer H. Hessler to active membership, a ballot being taken, he was unanimously elected.

The President reappointed the Committee on Membership: Charles H. LaWall, William E. Lee and O. W. Osterlund, with the Treasurer and Recording Secretary ex-officio.

The names of those proposed for Honorary Membership at the quarterly meeting in June, and laid over for action at this meeting, were read. A ballot being taken, the following named gentlemen were unanimously elected to Honorary Membership: Dr. Carl L. Alsberg, Chief of the Bureau of Chemistry, U. S. Department of Agriculture, Washington, D. C.; Andrew L. Winton, in charge of the Government Laboratories at Chicago, Illinois; Heinrich Zornig, Apothecary and Curator of the Imperial Plant Physiological Institute at Munich, Germany; Ernest Gilg, Professor in the Pharmazeutische Institute, University of Berlin, and Curator of the Imperial Botanical Museum of Berlin. Erwin F. Smith, Author, and Director of the Laboratory of Plant Pathology of the U. S. Department of Agriculture, Washington, D. C.

Mr. Joseph W. England read the following memoir of William Theodore Wenzell, which was ordered entered and filed.

William Theodore Wenzell, of San Francisco, died at the age of eighty-four years on July 31, 1913, at Lane Hospital. He had been actively engaged in his work as Chemist in the Appraiser's Stores, San Francisco, up to the time of his short illness. Mr. Wenzell was born at Muhldorf, Germany, in 1829, and came to this country when a child, graduating from the Philadelphia College of Pharmacy in 1855, the subject of his theses being Corydalis Formosa. In 1864 he received the M.D. degree from the LaCrosse Medical College, Wisconsin. He also received the M.D. degree from the Medical College of the Pacific in 1876. In 1872 he was made Professor of Chemistry and Toxicology of the California College of Pharmacy which position he held till 1898. From 1875 to 1880 he held a similar chair in the Medical College of the Pacific, also in the Cooper Medical College from 1897 to 1902. In 1899 he was appointed a Chemist to the United States Appraiser's Stores which position he held up to the time of his death. He was a life member of the American Pharmaceutical Association, joining in 1870. He has contributed a number of valuable papers to American Pharmacy.

Election of Three Trustees. The report of

The Committee on Nominations was read and Messrs Osterlund and England were appointed tellers. After some discussion in reference to reopening the nominations, a ballot was taken, the tellers reporting the re-election of E. M. Boring, Theodore Campbell and Charles Leedom to membership in the Board of Trustees for the ensuing three years.

Professor Kraemer referred to the valuable publications emanating from the Hygienic Laboratory, United States Public Health Service, Washington, D. C., and called especial attention to the Digest of Comments on the Pharmacopœia of the United States and on the National Formulary, the one just received being for the year 1911, and moved that the Librarian be instructed to convey the thanks of the College to the Surgeon General, so ordered.

The President called attention to the improvements made to the Library, and to other portions of the College and praised the Committee for the excellent work they had accomplished.

C. A. WEIDEMANN, M.D.,
Recording Secretary.

ABSTRACTS FROM THE MINUTES OF THE BOARD OF TRUSTEES.

June 3rd. Sixteen members were present.

Committee on Museum and Herbarium reported having received a number of volumes of the Proceedings of the American Pharmaceutical Association. Mr. Boring stated that several volumes of the "Proceedings" also Reports of the Pennsylvania Pharmaceutical Association had been received from Mrs. William McIntyre. Acknowledgments of these gifts were made to the donors.

Committee on Instruction presented a detailed report from Professor Moerk covering several phases of the course in his department. They also advised that it would be necessary to import a considerable amount of required glassware for the Chemical Laboratory and that some repairs were needed. The matter of supplies and repairs were referred to the appropriate committees, with power to act.

The Chair deemed it advisable, in view of Professor Moerk's position as Assistant Dean and his interest in all matters pertaining to the College, that he be asked to be present at the meetings of the Board. This being put in the form of a motion was adopted.

Supplies for the Chemical Laboratory and estimates for supplies for the department of Bacteriology were referred to the Committee on Supplies with power to act.

Committee on Announcement reported that the catalogue number of the Bulletin was in press and would be ready for distribution in a few days.

Professor Sadtler for the Committee on Publicity reported that various communications had been forwarded to the Alumni and good results were apparent.

Committee on Commencement reported a successful Commencement, and moved that resolutions of thanks be extended to those who had rendered services. It was so ordered.

The Committee stated that June 18th, 1914, was the day fixed for the next Commencement, and moved that the Treasurer be authorized to engage the Academy of Music for the occasion. It was so ordered.

Mr. Joseph W. England stated that Mr. C. M. Kline desired to change the title of the Mahlon N. Kline prize to read "The Mahlon N. Kline Pharmacy Prize offered by the Mahlon N. Kline estate." It was so ordered.

Mr. French presented framed photographs of Sir William Ramsey and Lord Kelvin which were received with the thanks of the Board.

Dr. John A. Roddy (nominated at a prior meeting of the Board) was unanimously elected Professor of Bacteriology. It was also ordered that the new Department be known as the Department of Bacteriology and Hygiene.

BOOK REVIEWS.

THE VOLATILE OILS. By E. Gildemeister and Fr. Hoffmann. Second Edition by E. Gildemeister. Written under the auspices of the firm of Schimmel & Co., Miltitz near Leipzig. Authorized translation by Edward Kremers, Madison, Wisconsin. First volume. With two maps and numerous illustrations. New York: John Wiley and Sons Inc., 432 Fourth Ave., 1913. $5.00.

The first volume of the second German edition of Gildemeister's "The Volatile Oils" was reviewed in this JOURNAL in 1910 (p. 581), so that our readers are doubtless familiar with the scope and contents of this work. It is very fortunate for students of essential oils in Great Britain and the United States that we have this excellent translation by Professor Kremers. This work has come naturally to be looked upon as a standard and is relied upon in practical work. Students of plant chemistry, as well as of the volatile oils, owe a very great debt to Messrs. Schimmel & Co. for publishing in such excellent and permanent form the results of the investigations in their own laboratories. They might like many other manufacturers have kept much of this information for their own benefit. It would have spared them not only a very great expense, but a great amount of worry and anxiety. They preferred, however, to give to science the results of their labors. In the giving of this they have not only enriched science and chemical industry but they done an ennobling work which will stand as a monument to this firm. It is an example that well might be emulated by all of the large manufacturing houses.

H. K.

TREATISE ON GENERAL AND INDUSTRIAL ORGANIC CHEMISTRY. By Dr. Eltore Molinari. Translated from the second enlarged and revised Italian edition by Thomas H. Pope. With 506 illustrations. Philadelphia: P. Blakiston's Son & Co., 1913. $6.00 net.

While it is true that there are several excellent English and American works on "Industrial Organic Chemistry," Molinari's "Trattata di Chimica Organica" has been highly esteemed by very many European workers. It was Liebig who expressed the thought that "to obtain a sound practical man it is necessary to train a good theorist." Molinari amplifies this maxim to meet modern needs by saying: "In order to produce, rapidly and with increased certainty, a sound, practical man, it is necessary to train a good theorist and to initiate him into both the theoretical and practical study of the more salient industrial problems." This is the keynote of the present work. With a knowledge of various syntheses and constitutional formulæ of a commercial product, he claims that the chemist should also possess a knowledge of industrial processes as well as the statistics of production. In this work we find a lot of fundamental information of a general scientific character concerning organic compounds and this is frequently supplemented by industrial processes of the more important substances considered. The author dwells preferably on the industries of illuminating gas, sugar, alcohol, beer, acetic acid, dyeing, textile fibres, fats and soaps, explosives, etc.

In the English translation Professor Pope has made a number of alterations in and additions to the text of the second Italian edition, these consisting principally in amplification of the statistical data referring to Great Britain and the United States. H. K.

MODERN RESEARCH IN ORGANIC CHEMISTRY. By F. G. Pope. With 261 diagrams. New York: D. van Nostrand Company, 1913. $2.25 net.

In an introductory note by J. T. Hewitt in this volume it is stated that " in the course of the past century the study of organic chemistry has been pursued with an energy which has not been exceeded in any department of science, and, by sustained effort, not only has a better insight been obtained into processes of life, but many branches of industry have been revolutionized." The student of research plays an important part in the development of science, but it is very fortunate there are those who are willing to take the time to survey the field of research, delve into the published papers and after assimilating and boiling down the facts give us the fruits of their labors. The present volume is one of these indispensable books that is stimulating indeed. How inspiring to the student are the words of Mr. Hewitt in his introduction wherein be says: " Organic chemists have achieved much, and as the habit of simply recording the melting-points and analytical data of new compounds dies out, it will be more clearly recognized what an enormous field of work lies in front of us."

Among the subjects considered the following may be mentioned: the polymethylenes; the terpenes and camphors; the uric acid or purine group; the alkaloids; the relation between the color and constitution of chemical compounds; salt formation of pseudo-acids and bases; the pyrones; ketens, ozomides, triphenylmethyl; the Grignard reaction; etc. H. K.

MATERIA MEDICA, PHARMACOLOGY, THERAPEUTICS AND PRESCRIPTION WRITING. By Walter A. Bastedo, Ph.G., M.D., Associate in Pharmacology and Therapeutics at Columbia University. Octavo of 602 pages, illustrated. Philadelphia and London: W. B. Saunders Company, 1913. Cloth, $3.50 net.

This work of Bastedo's on " Materia Medica; Pharmacology, Therapeutics and Prescription Writing," shows a great amount of reading and is a very excellent attempt to co-ordinate the results of scientific pharmacology with rational therapeutics. The point of view of the author is like that of the more advanced teachers in the United States and he has succeeded in giving us a work that will command the attention of students in both our colleges of pharmacy and medical schools. H. K.

HANDBOOK OF THE HISTORICAL MEDICAL MUSEUM. At the 17th International Congress of Medicine held in London this year there was exhibited, for the first time, the Historical Medical Museum organized by Henry S. Wellcome. This museum contains objects of historical interest connected with medicine and allied sciences and a careful perusal of the handbook will show that many phases of the healing art are represented from the earliest to more recent times.

This handbook contains the usual picture of Hippocrates and a plan, illustrating the general arrangement of each section and the itinerary is in accord with the sequence of objects described. Evidently, judging from the index, the museum consists of an abundance of tremendously interesting objects, objects that would make glad the heart of a lover of things historical. Water color drawings, engravings, oil paintings, statuary, and carvings both in ivory and wood, having for their theme some connection with the art and science of healing are much in evidence.

Among the pictures listed of special interest to pharmacists mention might be made of the "The Drug-Market at Constantinople"; "The Apothecary" by an unknown painter of the Dutch school; "Interior of an Italian Pharmacy," 16th century; "Ergot of Rye," a series of pictures showing its development; "Discovery of Quinine," showing Pelletier and Cavanton in their laboratory; a portrait of "Joseph Priestley," the discoverer of oxygen; "Leuwenhoeck with his Microscope," who described minute living organisms and laid the foundations of the science of Bacteriology; "Christopher Wren making his first demonstration of a method of introducing drugs into a vein, before Dr. Willis, 1667"; "Dioscorides, the Greek Father of Pharmacy, describing the method of gathering, and the properties of the mandrake." If the large number of illustrations of this drug contained in this handbook is any criterion, mandrake must have been a much-used remedy in early medical times. Many pictures of Harvey and other great thinkers of early times who by their work made modern medicine possible are also exhibited. One in particular an engraving of Harvey demonstrating his theory of the circulation of the blood to King Charles.

On the ground floor of the museum is shown a London Pharmacy of the 18th century, the shop front of which is the original of the pharmacy established in 1798 by John Bell, founder of the Pharmaceutical Society of Great Britain.

So many and varied and of such interest are the things indexed that one longs for an opportunity to visit old London and see for himself this Historical Medical Museum.

John K. Thum.

CURRENT LITERATURE.

Skin Rashes Following the Administration of Atophan.

Skin rashes, similar to those following the administration of antipyrin, are not uncommon after atophan has been taken. As this drug has been recommended as of value in the treatment of urticaria the report of five cases, by Phillips of Western Reserve University Medical Department, showing the occurrence of various skin rashes—purpura, urticaria, and scarlatiniform eruptions—is timely.—*Journal A.M.A.*, Sept. 27, 1913, page 1040.

Ozone.

In a very interesting paper on the bactericidal action of ozone Jordan and Carlson record some experiments to determine the value of this gas. As an aid to the destruction of bacteria they found it of little or no use. They also make the statement that it has no practical value for room disinfection. This statement is doubly interesting because ozone has been recommended by interested parties as of value for air purification of occupied rooms. The results of the author's experiments lead them to believe that human beings are injuriously affected by amounts of ozone far less than are necessary to produce even slight bactericidal effects.—*Journal A.M.A.*, Sept. 27, 1913, page 1007.

Estimation of Acidity of Tincture of Iodine.

A definite weight of the tincture, 50 grams for instance, is mixed with eight times its weight of distilled water and, after standing one hour, filtered. The liquid thus freed from the precipitated iodine is shaken with a small excess of barium carbonate. The whole of the free hydriodic acid is thus converted into soluble barium iodide, which in turn is precipitated as barium sulphate; 100 of barium sulphate corresponds to 109 of hydriodic acid. By this method, it was found that a tincture which had been exposed in a colorless bottle to the diffused light of the laboratory for 9 months, showed the presence of hydriodic acid to the extent of 1.42 per cent.—*Jour. Pharm. Chim.*, July 16, 1913, page 75.

FRENCH OTTO OF ROSE.

Bulgaria's calamity has proved France's opportunity. For generations the perfumery world has drawn its supplies of otto of rose from the Balkan States, and up to a few years ago we were taught to believe that nowhere else on earth were climatic conditions favorable to its production, but this summer we are being treated to French otto of rose of excellent quality and at a comparatively low price. From our friends, Vimard, Dhumez and Monschein, of Vallauris (Alpes Maritimes), we have just received two samples of otto of rose of guaranteed purity. One of these samples, prepared exclusively from one species of rose, has the following characters:

Specific gravity at 25° C.	0.8717
Optical rotation	6° 40′
Melting point	over 22° C.

The other specimen, prepared from bulked deliveries of various kinds of roses, gave the following figures:

Specific gravity at 25° C.	0.8679
Optical rotation	3° 30′
Melting point	over 23° C.

Although the makers are not able to state the proportions of the various species of flowers employed, they are quite prepared to guarantee the purity of the product, and one is at a loss to account for the difference of the figures for the optical rotation. Although the rotation of the sample first described is about the same as that of an essence distilled from "roses de Mai," that of the specimen prepared from the mixed flowers corresponds closely to the figure for Bulgarian otto.

We learn that the French perfumes are largely adopting these new essences for their specialties, the fact that there are differences between these and the Bulgarian products being of little moment. Just at present, of course, while the enterprise is in its infancy, the amount of product is small, but with a rich supply of material, perfected machinery, scientific control, and the business acumen to be found in France, there is every reason to anticipate a larger output next year, and still another anxiety for Bulgaria.—*Perfumery and Essential Oil Record,* August 30, 1913, page 265.

NOTES AND NEWS.

An International Pharmacopœal Bureau.—At the recent International Congress of Pharmacy, a proposal to form an International Pharmacopœal Bureau was discussed and a commission was appointed to consider the question and to submit to the International Pharmaceutical Federation at an early date a scheme for the establishment of such a bureau. Among the duties of such a bureau, as that proposed, would be the collection and examination of all literature relating to pharmacopœal revision, the experimental investigation of new drugs and preparations, and no doubt the influence of the bureau would tend to encourage the work already commenced in the direction of the unification of pharmacopœias. The commission is composed of seven members, representing respectively, Belgium, France, Germany, Great Britain, Holland, Switzerland and the United States; most of the members are associated with the revision of their national pharmacopœias, the American representative being Prof. Joseph P. Remington, Chairman of Committee of Revision of the Pharmacopœia of the United States of America.

Raising the Standard of Medical Practice.—A gift of $1,500,000 from the General Board of Education to the Johns Hopkins Medical School is to provide an income that will put the heads of departments on salary and eliminate all private fees. The gift is named after Dr. William H. Welch and his idea is that the new medicine wants men who will be too busy in the great field of research to think about money.

This is splendid idealism in the age of the practical: it is the true spirit that will urge medical progress to its possibilities and the resultant good tô the human race will be incalculable.

THE AMERICAN
JOURNAL OF PHARMACY

DECEMBER, 1913

THE DETECTION OF CHICORY IN DECOCTIONS OF CHICORY AND COFFEE.

By Charles H. LaWall and Leroy Forman.

Coffee is subject to a variety of adulterations in whole form, in the ground form and also in the form of the prepared beverage. The detection of adulterants in whole or ground coffee is a comparatively simple matter because of the characteristic appearance of the tissues of both genuine coffee and its adulterants when subjected to microscopic examination. Up to the present time, however, no satisfactory nor conclusive method has been presented in which the adulteration of the coffee could be proved after it was made up into the beverage.

The methods of McGill (*Trans. Royal Soc. Canada,* 1887) and of Tatlock and Thomson (*J. Soc. Chem. Ind.,* 1910), whereby the specific gravity or the refractive index of the decoction is determined, are not only too variable to detect slight admixtures but are valueless in the absence of positive knowledge as to the ratio of ground coffee to decoction. The method of Franz (*Arch. Pharm.,* 1876) in which the color reaction of the suspected decoction with an aqueous solution of cupric acetate is proposed, shows distinct differences between the pure decoctions but fails when applied to mixtures.

The method of Smith (*Pharm. J.,* 1880) depending upon the amount of color left in the decoction after precipitation with basic lead acetate, also fails to detect mixtures of the two.

Tatlock and Thomson (*J. Soc. Chem. Ind.,* 1910), mention the great difference in cupric reducing power of the 10 per cent. decoction but seem to have made no specific application of it as a means of detecting chicory in coffee and their figures are incomplete in this particular respect.

In the light of our present knowledge it is extremely unlikely that any specific tests for the positive identification of chicory in coffee in the prepared decoction can be devised, as no soluble constituents are present in roasted chicory which are not likely to be present in roasted coffee. It is possible, however, to prove adulteration by inferential tests, even when the actual nature of the adulterant is not capable of positive identification, as is seen in numerous cases in which cider vinegar is alleged to be "adulterated by the addition of some unknown substance high in reducing sugars," and in which the cases have been successfully sustained in court and the offenders convicted.

Such an opportunity for inferential proof of adulteration exists as regards coffee and chicory in the prepared decoction.

A number of samples of roasted coffee of authentic origin were obtained, covering all of the important commercial varieties. In these samples were determined, first, the amount of extractive, and second, the percentage of reducing sugars calculated in the extractive previously determined. The amount of extractive matter alone is inconclusive, of course, as no knowledge is usually obtainable concerning the ratio of ground coffee in the decoction. When, however, we come to consider the ratio of the extractive to the reducing sugars, we find that a very sharp line of demarcation exists by which it is possible to conclusively prove the presence of as small an amount as 5 per cent. of chicory in the ground coffee, and experience has shown by the examination of ground samples that smaller amounts than this are not likely to be used.

The results of the examination of the genuine coffees are as follows:

No.			Per cent. of extractive	Per cent. of reducing sugars in extractive
1	Java	(roasted)	1.58	1.92
2	East India	(roasted)	1.64	1.95
3	Mocha	(roasted)	1.98	2.17
4	Bogota	(roasted)	1.70	2.04
5	Mexican	(roasted)	1.72	2.47
6	W. Caracas	(roasted)	2.16	2.64
7	Santos	(roasted)	1.94	2.23
8	Rio	(roasted)	2.02	2.57
9	Peaberry	(roasted)	1.40	2.65
	Maximum		2.16	2.64
	Minimum		1.40	1.92
	Mean		1.79	2.29

Samples of two genuine specimens of roasted and ground chicory showed the following results expressed in the same manner:

No.		Per cent. of extractive	Per cent. of reducing sugars in extractive
1	Chicory	4.70	27.67
2	Chicory	6.10	25.20

It will be seen on comparing the results of coffee and chicory that the extractive matter alone affords no definite information upon which to base a conclusion but that the percentage of reducing sugars in the extractive matter is so widely different as to afford a ready means of detecting chicory in a decoction of coffee.

Sample mixtures of chicory and coffee were made up, using the chicory showing the lowest ratio and the coffee showing the highest ratio. The results were as follows:

Mixture	Per cent. of extractive	Per cent. of reducing sugars in extractive
2 per cent. chicory, 98 per cent. coffee	1.92	2.52
5 per cent. chicory, 95 per cent. coffee	1.96	4.62
10 per cent. chicory, 90 per cent. coffee	2.06	5.26
15 per cent. chicory, 85 per cent. coffee	2.10	7.11
20 per cent. chicory, 80 per cent. coffee	2.52	8.31
25 per cent. chicory, 75 per cent. coffee	2.26	9.25

With the exception of the sample in which 2 per cent. chicory and 98 per cent. coffee were used, which is just within the limits of the highest ratio observed in a pure coffee, the results all decisively and positively point to the adulteration of the coffee with a substance high in reducing sugars. The addition of 5 per cent. of cane sugar to 95 per cent. of coffee did not appreciably alter the results by the reducing sugars method, as shown by the following figures:

	Per cent. of extractive	Per cent. of reducing sugars in extractive
Coffee 95 per cent., cane sugar 5 per cent.	2.40	1.93

While the addition of the cane sugar could very readily be detected by a polarimetric examination, the above mixture showing a reading of several degrees in a 200 mm. tube, the reading of the pure chicory decoction (containing more than ten times the amount of reducing sugars) was negative, owing presumably to an approximate balancing of dextrose and levulose in the mixture.

It was also found that the ozazone produced in the chicory decoction by the phenylhydrazine method showed the same crystalline form as the ozazone prepared from invert sugar and that a mixture of as small an amount as 10 per cent. of chicory in coffee showed crystals of the ozazone by the phenylhydrazine test, while the pure coffee decoction contains so little reducing sugars as to yield no distinct crystals.

The estimation of reducing sugars in the above work was by the official method in Bulletin 107, U. S. Dept. of Agriculture, Bureau of Chemistry, and the results calculated to dextrose by Allihn's table in the same book.

The foregoing results clearly indicate that a coffee decoction which contains more than 3 per cent. of reducing sugars in its extractive matter may be looked upon as adulterated with chicory or some similar product high in reducing sugars. The method described above may also be used as a confirmatory method where chicory has been detected by microscopic examination.

THE PRESERVATION OF HYDROGEN PEROXIDE BY MEANS OF ACETANILIDE.

By A. M. Clover.

During the past few years, it has become an almost general custom to add a small quantity of acetanilide to solutions of hydrogen peroxide in order to prevent the decomposition ordinarily taking place. This very remarkable property of acetanilide has made it possible for manufacturers to place upon the market a peroxide solution that retains its strength for a long period of time and has eliminated almost entirely the danger arising from decomposition.

There has been some discussion as to the necessity and justification for the use of acetanilide and the claim has been made that the instability of the commercial peroxide solution is brought about by certain impurities, which are introduced during the process of manufacture, and that, were the methods of preparation so controlled as to eliminate these impurities, a stable product would result. In view of the greatly increasing use of hydrogen peroxide this question is one of considerable importance and the following experimental work has been designed to bring out the facts relative thereto. It has been found possible to prepare a chemically pure solution of hydrogen peroxide in sufficient quantity for experimental work. From a study of the behavior of such a solution we are able to arrive at very definite and indisputable conclusions concerning the effects of various impurities and of acetanilide upon the peroxide.

PREPARATION OF PURE HYDROGEN PEROXIDE.

Commercial hydrogen peroxide, about 3 per cent. in strength, was concentrated by distillation *in vacuo* until a strength of about 20 per cent. was obtained. When a sufficient quantity of this 20 per cent. product had been prepared, it was carefully subjected to further distillation and the distillate reserved; this distillation was continued until the residue showed a strength of from 35 per cent. to 40 per cent. At this point, distilled water was added, sufficient in amount to dilute the residue to 20 per cent. and the distillation continued. This process was repeated until the desired amount of distillate was obtained. In the above distillation the flask was immersed in a bath maintained at 50° and the temperature of the liquid in the flask never exceeded 40°. The vapor was condensed by means of an ordinary Liebig's condenser and the combined distillate contained over 1 per cent. of hydrogen peroxide. When a sufficient quantity of distillate was obtained, it was concentrated by distillation *in vacuo,* the temperature of the bath being maintained at 40° and that of the distilling liquid not exceeding 28°.

PROCEDURE.

For each series of experiments described, a separately prepared lot of peroxide was used, the purity of which had been assured by analysis. In all cases the total residue and the acidity of the preparations were negligible. The strength of the solution in hydrogen peroxide was determined by means of potassium iodide and thiosulphate and as given in the tables is represented by c.c. of N/10 thiosulphate. The strength in which the different substances were added is indicated in the tables by a fraction which is the ratio of the weight of substance to the volume of solution. In series III the acidity is expressed in terms of a normal solution. The solutions were preserved in 4 oz. bottles of amber-colored glass which had been thoroughly cleaned and dried *in vacuo*. Sixty to 75 c.c. of solution were used in each experiment. The bottles were well stoppered and placed in a closet, the corks of the less stable solutions being removed from time to time in order to relieve the pressure.

SERIES I.—EFFECT OF SEVERAL ACIDS AND SALTS.

The experiments of series I and II were preliminary and were designed to give a general idea of what behavior might be expected so that the final experiments might be better planned. The substances in series I were added approximately in the proportion of 1.5 gms. to the litre of peroxide solution. One c.c. of the original solution required 14.75 c.c. tenth-normal thiosulphate.

Total time of standing.	4 days.	12 days.	29 days.	53 days.	5 mos.
H_2SO_4	14.65	14.35	13.55	12.45	
H_3PO_4	14.6	14.35	13.80	12.85	
HCl	14.6	14.40	13.90	13.05	
Succinic Acid	14.45	13.95	13.25	12.45	
KCl	14.25	12.75	8.75.		
NaCl	14.25	12.40	2.15		
K_2SO_4	13.75	9.10	2.80		
$(NH_4)_2SO_4$	13.15	8.30	2.90		
Mg SO_4	13.35	8.80	2.50		
$BaCl_2$	14.10	12.25	5.75		
Acetanilide	14.7	14.65	14.55	14.45	14.30
Original Solution	13.65	11.45	5.65	1.65	

SERIES II.

One c.c. of the original solution required 13.80 c.c. tenth-normal thiosulphate.

Total time of standing	11 days	23 days	135 days
Original solution	10.75	6.25	
Acetanilide $\frac{1}{2000}$	13.75	13.70	13.45
HCl $\frac{1}{2000}$	13.45	13.00	9.20
HCl $\frac{1}{2000}$ + NaCl $\frac{1}{2000}$	13.30	12.85	0.15
HCl $\frac{1}{2000}$ + Na_2SiO_3 (anhydrous) $\frac{1}{2000}$	13.00	12.15	6.55
H_3PO_4 $\frac{1}{2000}$ + Na_2HPO_4 (anhydrous) $\frac{1}{2000}$	13.30	12.80	8.65
H_3PO_4 $\frac{1}{2000}$	13.30	12.85	8.45
HCl $\frac{1}{2000}$ + NH_4Cl $\frac{1}{2000}$	13.40	12.80	8.45
HCl $\frac{1}{6000}$	12.95	11.90	5.20

SERIES III.—EFFECT OF ACIDS IN DIFFERENT STRENGTHS.

One c.c. of the solutions when prepared, required 16.35 c.c. tenth-normal thiosulphate. In adding the acids the same volume was introduced in each case so that the resulting solutions were all of the same strength.

Strength of acid	Age at time of test	
	6 weeks	7 months
HCl $\frac{n}{25}$	14.80	9.45
HCl $\frac{n}{50}$	14.65	8.30
HCl $\frac{n}{100}$	14.85	8.70
HCl $\frac{n}{200}$	11.80	1.40
H_2SO_4 $\frac{n}{25}$	15.20	9.75
H_2SO_4 $\frac{n}{50}$	14.40	7.75
H_2SO_4 $\frac{n}{100}$	13.75	5.25
H_2SO_4 $\frac{n}{200}$	13.60	4.05
H_3PO_4 $\frac{n}{25}$	15.45	10.65
H_3PO_4 $\frac{n}{50}$	15.40	11.60
H_3PO_4 $\frac{n}{100}$	15.40	11.05
H_3PO_4 $\frac{n}{200}$	15.10	9.55
Boracic acid	8.41	

SERIES IV: SOLUTIONS $\frac{1}{100}$ NORMAL IN HCL. EFFECT OF VARIOUS SALTS ALONE AND WITH ACETANILIDE.

The entire sample of H_2O_2 used in this series was made $\frac{1}{100}$ normal in HCl. The strength of acetanilide was 1 to 2000. The salts were added in strong solution, the same volume being used in each case. Where no salts were added an equal volume of pure water was used, so that all solutions have the same initial strength in H_2O_2. The concentrations of the salts indicated are in terms of the anhydrous compounds. To the solutions containing Na_2SiO_3 there was added enough concentrated HCl to neutralize the former, the amount required having been previously determined by titration. At the end of six months the solutions to which acetanilide had not been added were found to be so far decomposed that the experiments were not continued. One c.c. of the solutions of Series IV required at the beginning, 21.40 c.c. N/10 thiosulphate.

	Age at time of test.	
	2 months	6 months
Original solution	12.1	3.75
Original solution with acetanilide	21.05	19.85
$NaCl \frac{1}{5000}$	12.5	3.65
$NaCl \frac{1}{5000}$ + acetanilide	21.0	19.95
$KCl \frac{1}{5000}$	12.75	4.20
$KCl \frac{1}{5000}$ + acetanilide	20.95	19.75
$CaCl_2 \frac{1}{5000}$	13.05	4.70
$CaCl_2 \frac{1}{5000}$ + acetanilide	20.95	19.90
$Na_2SiO_3 \frac{1}{3000}$	10.6	2.65
$Na_2SiO_3 \frac{1}{3000}$ + acetanilide	20.75	19.55
$FeCl_3 \frac{1}{500,000}$ + acetanilide	20.40	18.55
$Al_2(SO_4)_3 \frac{1}{500,000}$ + acetanilide	21.05	19.90

Series V: Solutions $\frac{1}{100}$ Normal in H_2SO_4. Effect of Various Salts alone and with Acetanilide.

The calcium sulphate was added in pure crystals. In all other cases the same procedure was followed as in making the solutions of Series IV. Just after being prepared, 1 c.c. of the solutions required 22.95 c.c. N/10 thiosulphate.

	Age at time of test	
	2 months	6 months
Original solution	14.35	5.35
Original solution, acetanilide	22.65	22.30
$Na_2SO_4 \frac{1}{5000}$	15.30	6.30
$Na_2SO_4 \frac{1}{5000}$ + acetanilide	22.75	22.35
$K_2SO_4 \frac{1}{5000}$	15.60	6.65

	Age at time of test.	
	2 months	6 months
$K_2SO_4 \frac{1}{5000}$ + acetanilide	22.70	22.25
$MgSO_4 \frac{1}{5000}$	15.80	6.80
$MgSO_4 \frac{1}{5000}$ + acetanilide	22.70	22.35
$CaSO_4 \frac{1}{5000}$	12.80	3.90
$CaSO_4 \frac{1}{5000}$ + acetanilide	22.70	22.40
$ZnSO_4 \frac{1}{5000}$	16.1	7.55
$ZnSO_4 \frac{1}{5000}$ + acetanalide	22.65	22.25
$CuSO_4 \frac{1}{50,000}$	1.00	
$CuSO_4 \frac{1}{50,000}$ + acetanilide	22.60	21.75

SERIES VI: SOLUTIONS $\frac{1}{100}$ NORMAL IN H_3PO_4. EFFECT OF VARIOUS SALTS ALONE AND WITH ACETANILIDE.

The same procedure was followed as with Series IV including the neutralization of Na_2SiO_3 with H_3PO_4. At the beginning 1 c.c. of the solutions required 23.65 c.c. N/10 thiosulphate.

	Age at time of test	
	2 months	6 months
Original solution	17.85	10.60
Original solution + acetanilide	23.35	22.90
$Na_2HPO_4 \frac{1}{5000}$	17.80	10.55
$Na_2HPO_4 \frac{1}{5000}$ + acetanilide	23.40	23.25
$CaCl_2 \frac{1}{5000}$	20.05	15.00
$CaCl_2 \frac{1}{5000}$ + acetanilide	23.20	22.9
$Na_2SiO_3 \frac{1}{3000}$	18.40	11.50
$Na_2SiO_3 \frac{1}{3000}$ + acetanilide	23.40	22.95
$Al_2(SO_4)_3 \frac{1}{50,000}$ + acetanilide	23.40	23.05
$Pb(C_2H_3O_2)_2 \frac{1}{50,000}$	19.75	13.90
$Pb(C_2H_3O_2)_2 \frac{1}{50,000}$ + acetanilide	23.45	23.15

DISCUSSION OF RESULTS.

From the results of series I, it is evident that, contrary to the general assumption, pure hydrogen peroxide is a very unstable substance and that its stability is greatly increased by the addition of small amounts of acid. The addition of salts of the alkali and alkaline-earth metals does not appear to have any marked effect. In two or three cases the resulting solutions are more stable and in the other cases they are less stable. By the addition of acetanilide alone to the solution its stability was greatly increased, the decomposition being about 2.7 per cent. in 5 months.

From series II the same conclusion may be reached in regard to the stability of pure hydrogen peroxide, and the effect of acids and of acetanilide upon the solution. The combined effect of acid and its salt and of free silica is here brought out and it is evident that in acidified solutions the salts, at the strength in which they were used, have no influence upon the stability of the solutions, while free silica renders them less stable.

In series III a study was made of the effects, in varying strengths, of the different acids sometimes used in acidifying the commercial solution of hydrogen peroxide. Phosphoric acid gave the best results at all the concentrations used. It will be noted, however, that the best preserved solution had lost in strength nearly 30 per cent. in 7 months and that such a solution, although more stable than the chemically pure peroxide, would not answer at all for commercial purposes.

In series IV, V, and VI there were introduced into the solutions of pure peroxide all of the mineral impurities likely to occur in a commercial preparation, and in the maximum concentrations in which they might be found. In order to cover the ground completely and so that the different series might serve as a check upon each other, three different acids were used with their corresponding salts. Each impurity was used with and without acetanilide so that the effect of this preservative might be seen in all possible cases.

Several different brands of commercial peroxide were examined and the total mineral residue was always found to be less than .05 per cent. This residue was found to consist in all cases, of over 50 per cent. silica, so that the total mineral matter other than silica was less than 1 part in 4000.

The results obtained in the last 3 series of experiments are invariably the same. The decomposition in those solutions containing acetanilide, is only a small fraction of that in the corresponding solutions which do not contain the preservative.

There can be no question as to the usefulness of this substance for the purpose. As to the mineral impurities, the salts of the alkali and alkaline-earth metals and all other salts used, except those of copper and iron, appear to have no influence whatever upon the stability of the solutions when acetanilide is used. Traces of copper and iron have a very deteriorating effect but this is prevented to a great extent by acetanilide. The concentration of iron used was considerably greater than that which need be present in a commercial solution. Without acetanilide, silica appears to have a deteriorating effect but this result is almost neutralized by the preservative. As previously indicated in the tables, the concentration of acids used in series IV, V and VI was $\frac{1}{100}$ normal, which is the maximum limit allowed by the U.S.P. The decomposition of the preserved solutions of series IV (HCl) was more than twice as great as that in the case of the other two series. An explanation of this may be found in the fact that all the solutions of series IV that contain acetanilide, deposited a yellow sediment of organic matter on standing.

It is of considerable interest to note that the stability of the pure peroxide of series I and II which contains acetanilide alone, is about the same as that of the preserved solutions of series V and VI, which were acidified.

Scientific Laboratory of Parke, Davis & Co.,
Detroit, Mich., Oct. 27, 1913.

SOME OBSERVATIONS ON THE POLLEN OF POISON SUMACH.

By L. E. Warren.

From prehistoric times it has been known that contact with certain plants would occasionally produce inflammatory conditions in the skin of human beings. Until within comparatively recent years the belief has been quite general that such plants as the poison ivy and poison sumach, which are more venomous than most others, give off an invisible, mysterious emanation or vapor which, if allowed to touch the skin, produces the complex symptoms so well known as "ivy poisoning." This vapor was believed to be so insidious and penetrating that sensitive persons could easily be poisoned by passing near the emanating plants without touching them.

That the poisonous principle of this class of plants is a volatile substance appears to have been the belief of all of the writers who have treated the subject previous to 1895. Pfaff and his pupils [1] then demonstrated that the poisonous constituent of poison sumach (*Rhus vernix* L.) and poison ivy (*Rhus toxicodendron* L.) was a non-volatile, resin-like substance. This substance, which Pfaff called toxicodendrol, was found in nearly all parts of these plants. He suggested that toxicodendrol might be a constituent of the pollen of these plants and (since the flowers are dioecious and anemaphilous) it appeared possible that sensitive persons might be poisoned if the pollen were blown upon the face or hands. Pfaff says: [2]

> " . . . The activity of toxicodendrol in minutest traces may make it possible for a few pollen grains of poison ivy to cause skin eruption; and the few cases of action at a distance which are so often quoted, may concievably be thus explained. But, in my own opinion, it is more than doubtful if ever a case of ivy poisoning has occurred without direct contact with the plant or some article which has been in contact with the plant. The long latent period of the eruption in some cases may obviously render mistakes extremely easy as to the occasion when contact with the plant really occurred."

However, Pfaff did not make any examination of the pollen of either poison ivy or poison sumach for toxicodendrol.

Schwalbe [3] has stated the belief that poisoning without direct contact with the plant is easily possible. After a microscopical examination of *Rhus diversiloba* T. & Gr. (the Californian species of poison ivy) he reported as follows:

> " . . . There are in the leaves, in the skin of the stems and stalks of the leaves and flowers, and even in the petals, lactiferous vessels containing the poisonous matter of the plant.
>
> "Upon these vessels grow hairs loaded more or less with poisonous oil. These hairs are prevalent on the stems, on the under surface of the leaves and even on the petals of the plant. The hairs derive the poison by osmosis from the laticiferous vessels and are carried when broken off, easily by the wind or by the help of man or animals to persons liable to the affection. The presence of the hairs on the stem during the winter, when there are no leaves on the shrub explains the fact of the poisonous qualities of the plant

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[1] Pfaff and Orr: *Science*, n.s. 1, 110 (1895).

[2] *Jour. Exp. Med.*, 2, 192 (1897).

[3] *Med. Rec.*, 63, 855 (1903).

> even in winter time. Generally the hairs penetrate into the sudoriferous and sebaceous glands and this observation is corroborated by the fact that those parts of the skin perspiring easily are affected most frequently."

Schwalbe states[4] that the poisonous oil may be detected in and on the pollen grains.

> "Der Blüten-staub enhält das giftige Oel in kleinen Mengen; man kann in und an den Pollen Körnnern das Toxicodendrol nachweisen."

Von Adelung,[5] too, inclines to the opinion that the pollen of these plants contains the poisonous oil. He says:

> "That persons are poisoned without direct contact with the plant is too common an observation to be denied. The explanation is doubtless the mechanical transportation of the poison, as happens when the pollen, or the plant hairs, or other dust from the plant is carried by air currents. Or, perhaps as commonly, the transporting agents are simply clothes or tools or animals, which, after brushing against the plant, are able to transfer the poison to susceptible persons."

On the other hand Rost and Gilg[6] have studied the toxic effects of *Rhus toxicodendron* from specimens grown in the botanical gardens at Dahlem and have concluded that neither the hairs nor the pollen of that plant contain any of the poison. They obtained the hairs partly by blowing a current of air across the detached branches of the plant while confined in a glass case and collecting the disengaged particles on glass plates moistened with diluted glycerol and partly by placing open dishes containing diluted glycerol under the standing bushes. Their findings for the hairs and pollen of *R. toxicodendron* are exactly the reverse of those reported by Schwalbe for *R. diversiloba*. Since the two plants are so similar botanically and their physiological effects are identical, the differences noted are scarcely to be explained except on the ground of careless observation by one or the other of the experimenters. The studies of Rost and Gilg were so carefully carried out and were, withal, so exhaustive that the preponderance of evidence appears to lie in their favor.

It is known that the poisonous principle of the several species of Rhus is an amber-red, non-volatile, liquid, resinous substance which combines with the alkali hydroxides to form nigrescent compounds and otherwise behaves like certain phenolic compounds. The toxic resin exists in the plant in the form of an emulsion which readily blackens with the alkali hydroxides. So delicate is this reaction that minute amounts of the substance may be detected by the microscope if the plant tissues be mounted in an alcoholic solution of potassium hydroxide.

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[4] *Muench. med. Woch.*, 49, 1616 (1902).

[5] *Arch. Int. Med.*, 2, 148 (1913).

[6] *Ber. Pharm. Gesellschaft*, 22, 296 (1912).

The author has long been skeptical concerning the poisonous properties of the pollen of these plants. Several years since he was informed by Professor A. B. Stevens that he (Stevens) had made some attempts to isolate the poisonous oil from the pollen of *Rhus vernix* but without success. The experiments were few and were not published although attention[7] has already been called to them in print.

During the past summer the author collected some of the pollen from the flowers of *Rhus vernix* L. growing in northern Indiana. Physiological and micro-chemical tests with this demonstrated that it contained no poisonous constituent.

On three occasions[8] during an interval of two weeks during the 1913 flowering season of poison sumach attempts were made by the method given below to procure pollen from numerous male plants:

> The apparatus consisted of a two-inch funnel, a four-inch funnel, a 500 c.c. suction flask, a bicycle compression pump and gas tubing. The smaller funnel was attached to the pump by means of the gas tubing while the larger one was fitted into the mouth of the suction flask by means of a perforated cork stopper. The outlet tube of the suction flask acted merely as an escape for air. The inner surface of the larger funnel and the interior of the suction flask were moistened with 75 per cent. alcohol. During the operation the smaller funnel was held near a panicle and by means of the pump a strong current of air was blown for some minutes upon it and into the mouth of the larger funnel which was held upon the opposite side. By this means some pollen was collected but the quantity was much less than desired. Better success was attained by jarring the flowering stems while holding the larger funnel (and flask) directly below.

Some of the pollen which had been disengaged from the anthers of the flowers by shaking the flower stems, was placed on a slide and examined with the microscope. When dry the pollen is in the form of orange-yellow, ellipsoidal grains. If moistened with alcohol or water the grains swell and assume a globular shape. The addition of a few drops of an alcoholic solution of potassium hydroxide to the pollen grains on the slide produced no change of color, *i.e.*, by microchemical tests the pollen appeared to contain no poisonous resin. A small quantity of the pollen was then macerated for several hours with 95 per cent. alcohol, the mixture filtered and the solution allowed to evaporate spontaneously to small volume. A portion of the filtrate gave no black color or precipitate when treated with an alcoholic solution of potassium hydroxide. Another portion of the filtrate was allowed to evaporate spontaneously almost to dryness and a drop of the residue tested for poisonous properties, according to the physiological method (slightly modified) of Tschirch and Stevens[9]:

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[7] *Pharm. Jour.*, 83, 562 (1909).

[8] The author is indebted to Prof. A. H. Clark of the University of Illinois School of Pharmacy for aid in collecting the pollen.

> This consists in thoroughly rubbing a drop of the suspected liquid into the integument of the forearm by means of a glass rod, thus covering a circular area about 1 cm. in diameter. After thirty minutes the part treated is washed with ether, then with alcohol, and lastly with soap and water. If the substance were poisonous the area treated will exhibit a noticeable redness and perhaps slight itching after twenty-four to thirty-six hours. If a negative result be obtained the experiment is repeated with the difference that the test material is allowed to remain upon the arm for from one to two hours. In doubtful cases a third experiment continuing through twenty-four hours should be carried out.

When tested by the above method upon four individuals the alcoholic extract from the pollen of *Rhus vernix* showed absolutely no poisonous properties. Although these tests, perhaps, should not be considered as absolutely proving the innocuousness of the pollen of poison sumach under all conditions they furnish strongly presumptive evidence in that direction. The evidence that rhus poisoning may be wind-borne is materially weakened by the results and the theory that poisoning can take place only by contact with the plant receives additional support.

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[9] Tschirch and Stevens: *Arch. Pharm.*, 243, 504 (1905); also AM. JOUR. PHARM., 78, 63 (1906).

FORMATION AND DISTRIBUTION OF ODOROUS PRODUCTS IN PLANTS.[1]

By Eugéne Charabot.

The study of the mechanisms which regulate the formation of the odorous matters and their evolution, the investigation of the relations existing between the chemical phenomena which modify these substances and the immediate manifestations of the life of the plant, the knowledge of the part played by the essential oils in the vital economy, constitute so many enticing problems which, it will be readily conceived, have a capital importance, not only from the point of view of rational cultivation and of judicious harvesting, but also from the point of view of the rational extraction of the perfume of the plant.

To this study I have devoted, either alone or in collaboration, principally with M. Al. Hebert, more than ten years of research work.

The question embraces: the formation and circulation of the odorous compounds; their evolution and the mechanism of this evolution; the genesis of the odorous matters and the physiological rôle of the perfumes.

Formation and Circulation of the Odorous Compounds.—The odoriferous plants form two very distinct groups as regards the distribution of their aromatic principles among the various organs. In some the essential oil makes its appearance in the green organs; in the others it exists exclusively in the flowers. Thus it will be necessary to consider separately the perfume in the entire plant and the perfume in the isolated flower.

The Perfume in the Entire Plant.—We have experimented with various representatives of the vegetable kingdom, belonging to different families and containing the most diversified chemical substances, and we have arrived at the following conclusions:

The odorous kinds of matter make their appearance in the young green organs. They continue to form and accumulate until the flowering period, but with an activity which slackens more or less appreciably. They migrate from the leaf into the stem, and thence into the inflorescence, obeying the laws of diffusion: a portion enters into solution and, by osmosis, penetrates into the stem. On arriving in a medium already saturated with similar products, a portion is precipitated, whilst the rest, consisting of a relatively soluble mixture, continues to diffuse through the membranes and reaches the organs of consumption, particularly the inflorescences.

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[1] Lecture delivered at the Pharmaceutical meeting of the Philadelphia College of Pharmacy, October 17, 1913.

At the time when the work of fertilization is accomplished, a certain quantity of essential oil is consumed in the inflorescence. It is possible and even probable that the green organs produce at the same time further quantities of odorous matters; experiment only permits of the determination of the fact that the difference between the production and consumption is expressed by a loss at the period when the functions of the flower are accomplished.

The practical consequence of this last conclusion is that the harvesting of the perfume-yielding plants should be effected shortly before this consumption takes place, that is, before the act of fertilization.

When this act has been accomplished, the odorous principles appear to descend again into the stem and, generally, into the organs other than the flower, a migration which is probably induced by the dessication of the inflorescences, which involves, other things being equal, an increase in the osmotic pressure and a partial precipitation *in situ* of the least soluble principles.

The Perfume in the Isolated Flower.—There exist, as was supposed by J. Passy and as was proved by A. Hesse and his collaborators, two categories of plants: one class, continuing to produce odorous matters when placed under conditions such that the vital functions may still be exercised; the other class, containing the whole of their odorous principles in the free state and incapable henceforth of producing any further quantity, even though their vitality be not arrested.

Evolution of the Odorous Compounds and Its Mechanism.—These researches, which I have carried out partly in collaboration with M. A. Hebert, have led to the following conclusions: The compound ethers (esters) have their origin, in particularly active fashion, in the green portion of the plants, by the direct action of the acids on the alcohols previously formed. This phenomenon of esterification is assisted by a special agent playing the part of a dehydrating agent, probably an enzyme of reversible activity.

The influences which are capable of modifying the plants so as to adapt them for a more intense chlorophyllian function are favorable at the same time to esterification, because this function is favorable to the mechanical elimination of water.

Thus the chlorophyllian function tends to acquire a new significance: it not only assures the fixation by the plant tissues of carbonic acid gas, it not only effects, by favoring transpiration, the circulation of the liquids which carry and distribute the principles necessary to the mineral nutrition of the plant, but it also activifies, once the carbon is assimilated, the condensations which enable the passage from a simple chemical structure to one of the innumerable complex structures, the study of which taxes all the ingenuity of the chemists.

When the alcohol is capable of readily parting with the elements of water, it gives rise, together with the compound ethers (esters) to the corresponding hydro-carbon, so that the first transformations which the alcohols undergo are due to phenomena of dehydration.

The phenomena of isomerisation, that is, changes of nature without change of composition, also proceed together with the metamorphosis of the odorous matter. Lastly, the alcohols and their ethers are actively converted into their oxidation derivatives, particularly when the inflorescences appear, in which organs the fixation of oxygen by the tissues is particularly intense.

Genesis of the Odorous Matters.—The sum of my researches, and the interesting observations of M. Hesse lead to a conception of the genesis of the odorous matters in the plant. A large number of the odorous products, very diverse in their functions and chemical structure, are produced in consequence of the splitting up, with fixation of the elements of water, of principles called glucosides. It is sufficient to admit the general nature of such a mechanism to arrive at a satisfactory explanation of the facts observed with regard to the formation of the odorous matters and their appearance at any particular point of the vegetable organism.

It seems to me that there is reason to believe that the glucoside which is capable of yielding the essential oil is formed or tends to be formed in the green portions. Most frequently, this glucoside immediately encounters the conditions of environment which are favorable to its decomposition, and then the essential oil appears in the green portions and begins to circulate, evolve itself and play its part. It may even happen that the medium is so favorable to the splitting up of the glucoside, that the latter can never be formed;

in this case the whole of the essential oil will exist in the free state in the green organs.

In other cases, the glucoside only comes in contact with the ferment which is capable of splitting it, in the flower. It will then only be after it has circulated as far as the flower, undergoing in its course more or less profound modifications, that it will be able to liberate the constituents of the essential oil, and the flower alone will be odorous. It is not impossible that, in certain flowers, the medium may be so favorable to the splitting up of the glucoside, that the latter is completely split up as soon as it arrives there. The formation of further quantities of essential oil in certain flowers in proportion as the essential oil already formed is removed, would be explained by a phenomenon of chemical equilibrium. The following reaction: Glucoside + Water = Glucose + Essential Oil, would be restricted by the reverse reaction, and a state of equilibrium would be reached when the glucose and the essential oil would amount to a certain proportion. Thus the flowers in question, if left to themselves, would retain a quantity of perfume which would not increase. On the other hand, if the essential oil be removed as fast as it is formed, the decomposition of the glucoside would no longer be limited, and it would continue to take place. Consequently, the appearance of a fresh quantity of perfume in the plant whose life is prolonged whilst the odorous matter is continuously removed, follows as the result of a phenomenon of chemical equilibrium in the vegetable cell.

The type reactions will serve as an explanation of the changes:

$R{\cdot}OH \rightarrow R{\cdot}CHO \rightarrow R{\cdot}COOH + (H_2O)n$
$R{\cdot}OH + R{\cdot}COOH \rightarrow R{\cdot}COOR + (H_2O)n$
$R{\cdot}CHOH \rightarrow R{\cdot}CO.R + (H_2O)n$—accounting for the formation of alcohols and phenols and their aldehyds, acids, esters and ketones, etc.

It will be understood, without it being necessary to insist on it, what advantage we have been able to derive from the practical standpoint as regards the value and the yield of perfume, from all these results obtained by scientific research.

Physiological Rôle of the Odorous Matter.—In collaboration with M. Hebert, I have proved that, contrary to what was previously believed, the odorous kinds of matter are not waste products of which the plant cannot make use. They are capable of being utilized by the plant, particularly when the latter is protected from light and no longer assimilates the carbonic acid of the air with the same intensity. They participate normally in the work of fertilization and of the formation of the seeds, in the course of which they are partially consumed.

THE ENZYMES AND THEIR IMPORTANCE IN PHARMACOGNOSY.[1]

By A. Tschirch, Berne.

In his opening remarks Professor Tschirch recalled the fact that in an address entitled "The Future of Pharmacognosy," delivered in London on the occasion of the presentation of the Hanbury Medal to him (see *C. & D.*, 1909, II., 548), he had considered it probable that the interest taken in the numerous synthetic remedies would be followed by "a return to drugs." This has taken place sooner than he expected, for quite recently the representatives of two important chemical-pharmaceutical factories informed him that interest in synthetic drugs is declining, and that there is a greater demand for drugs and preparations of them, especially for those which not only represent the active principles, but also the whole of the constituents. This fact draws once more greater attention to that group of remedies which have been employed for thousands of years, and the study of which is the aim of pharmacognosy.

Among the fundamental problems to be solved is the part played by the enzymes, not only in the synthesis of the active principles in the living plant, but also in the transformation of the living plant into a drug. For long it had been a problem for chemists to explain how the plant succeeds in executing at ordinary temperature the same reactions which can be performed in the laboratory only with the aid of energetic agents (strong acids or bases and relatively high temperatures), and how it is able with the utmost facility and in a very short time to perform syntheses requiring a considerable amount of energy, such as the building up of carbohydrates from carbonic acid and water and other photosyntheses. Formerly this ability was ascribed to the "vitality" residing in the living plant alone, and representing its particular source of energy for the accomplishment of this form of chemical work. To-day, however, the inception and course of numerous reactions in the living substance, which were formerly incomprehensible, can only be grasped by the assumption of enzymatic processes—the enzymes have assumed a part of the functions formerly attributed to "vitality."

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[1] Lecture delivered at a general meeting of the Eleventh International Congress of Pharmacy, September 17, 1913. Reprinted from *Chemist and Druggist*, Sept. 20, 1913, pp. 41-43.

We are, however, in the same position with regard to the enzymes as with electricity—we know its action and utilise it, but are ignorant of its real nature. Nobody has as yet held a pure enzyme in his hand, and, as with electricity, there are two points of view: (1) the minority see in enzymatic reactions only an exhibition of a special form of energy, and (2) others maintain that they are of a material nature. From the results of some experiments on the laccase of Kurushi and other materials from the protein reaction of the substance, and the fact that pyrrol is formed when it is heated with alkalies, in addition to the impossibility of separating the enzyme itself from gummy substances, Professor Tschirch assumes as a provisional working hypothesis that the enzymes are glucoproteids of the pyrrol group; but, as he states, this assumption may be right or wrong, and does contribute much towards explaining enzymatic actions. Of greater importance is the recognition of the colloid character of all enzymes; indeed, their action is only comprehensible on this basis in cases where several, often antagonistic, effects are displayed side by side in the same cell. There can be no doubt that not only in the animal, but also in the plant organism, in the same cell several—indeed, many—enzymes are present, of which some—*e.g.*, reductases and oxydases, glucoside-splitting and glucoside-forming—act in direct opposition to each other.

It is now established that the enzymes, like the catalysts, hasten the course of a reaction, that they are destroyed by heating to 70°–100° C., and that they can be "poisoned" by certain substances. On the other hand, the presence of certain substances (some metals, traces of acids and alkalies) enhance their action, but it is still doubtful whether and to what extent the enzymes as such participate in reactions, and whether, as is now generally assumed, the enzyme is not used up in the reaction, but before its effect sets in it enters into an adsorption combination with the substratum.

The fundamental properties of the enzymes were known to Schömein, who discovered the oxidising ferments in the 'sixties of the past century, although in 1809 Göttling, a pharmacist, had observed the peculiar oxydase reactions of gum acacia, without being able to explain them. Diastase was discovered in 1814, and in 1831 the identity of its action with that of ptyalin in the saliva was established.

Over one hundred and twenty enzymes are at present known, and the action of the majority of these consists in splitting up or transforming, although there is an increasing number of observations dealing with the synthetic *rôle* of enzymes. It has been possible to build up isolactose from *d*-glucose and *d*-lactose, and recently even the glucoside amygdalin has been built up with the aid of yeast maltase. It may be safely assumed that these building-up enzymes play a great part in the synthesis of plant substances. Of great interest is the fact that enzymatic processes may be reversed, as was shown in 1898 by Croft Hill, who proved that a reversible zymohydrolysis was possible.

To understand the processes which take place in the living medicinal plant and in its transformation into a drug and then in the latter itself, it is necessary to pass in review the best-known enzymes. The first and largest group, and the first to be known, is that of the hydrolases or hydratases, among which the carbohydrases are distinguished by their property of splitting up polysaccharides. To this group belong the biases or disaccharases, such as invertase, maltase, trehalase, gentiobiase, and the triases or trisaccharases, such as raffinase, gentianase, rhamninorhamnase and stachyase, as well as the polysaccharases, such as amylase, which splits up starch and is also known under the name of diastase, cellulase (or zytase), inulase, seminase, pectinase, xylenase, and gelase.

The glucosidases, the enzymes capable of splitting up glucosides, are widely distributed, and their principal representative is emulsin, which splits up amygdalin. A large number of these are named with reference to their respective glucosides, and include, *inter alia,* populinase, phloridzinase, salicylase, arbutase, gaultheriase, rhamnase, myrosinase (myrosin), tannase. Another class of the hydratases are the ester-splitting esterases, to which belong the fat-splitting lipase, and chlorophyllase, which is present with chlorophyll.

A particularly important group is that of the proteases and amidases, which includes pepsin and trypsin—pepsin belongs to the proteases. Another group, the coagulases, is mainly represented in animal organisms, and to it belongs chymase, or rennet, which causes the coagulation of milk. Of considerable importance to us are the oxydases, which possess the property of causing oxidation in the presence of oxygen and peroxides; these are extensively present in medicinal plants, and the guaiacum blue reaction is due to their action. The catalases decompose hydrogen peroxide in oxygen and water, while the reductases are responsible for reductions and also play a part in the living cell.

There is scarcely a living plant-cell free from enzymes; peroxydases and catalases especially appear to be present everywhere, and, as already mentioned, very frequently several enzymes of often antagonistic properties are present in the same cell. Ten enzymes have been isolated from the liver, and five enzymes from the bark of the horse-chestnut—viz., three different oxydases, one catalase and an anaëroxydase. The changes which the plant undergoes *post mortem* in its transformation into a drug are of special interest to pharmacognosy; here we have the phenomenon that, after separation from the plant, many parts undergo considerable changes, particularly of a chemical nature, such as those which occur during the process of drying. In 1888 Professor Tschirch established that within twenty seconds of removing the bark from *Cinchona succirubra* it assumed a reddish color on its inner surface, due to enzymatic action, but if the twig is put in water at 80° C., on removing the bark it does not redden. In the first phase of the process the glucotannide present is split up by a glucosidase, and in the second phase the aglucon thus produced is oxidised to the red coloring-matter by an oxydase. Vanilla affords another example of a different kind of enzymatic action. In 1888 Professor Tsirch found that on destroying the enzymes by alcohol vapor no vanilla odor occurs, and Winckel's experiments in 1909 proved that vanillin is excreted only in non-sterilised fruits.

It may be accepted as proved that in the process of drying glucosides are altered by the action of enzymes, while alkaloids are apparently less affected. The question now arises: What is the effect of drying on the enzymes themselves? Bourquelot found that several plants contain enzymes when fresh only, and that they disappear during drying or on keeping. The most permanent enzymes are found in such drugs as chicory, taraxacum, marshmallow, the gums, and the gum-resins. Gum acacia retains its enzymes for decades, as is also the case with the laccase of Japanese lacquer, which, on oxidation, imparts that special character to Japan-ware.

The question as to whether the enzymes contained in drugs should be destroyed and whether all enzymes possess a medicinal action is not yet answered. The human organism itself forms so many enzymes that it is extremely probable that those ingested are destroyed or assimilated. Zymase, for instance, is destroyed by the proteolytic ferment of the pancreatic gland. At present there are a number of "sterilised" drugs on the market as well as phamaceutical products made from them—digitalis, for instance; but it must be remembered that the pharmacological action of these "sterilised" drugs must be further studied, as our present knowledge is based chiefly on the use of non-sterilised drugs. A case illustrating the action of enzymes is afforded by gum acacia; mucilage of acacia undergoes considerable changes when mixed with other substances, especially readily oxidised substances, and for this reason the Swiss Pharmacopœia requires it to be heated—*i.e.*, to destroy the enzyme. On the other hand, several enzymes display a useful action. This is apparent in the processes to which such drugs as tea, cocoa, coffee, tobacco, vanilla, and tamarinds are subjected to improve them. With several drugs the perfume is only apparent after enzymatic processes have been at work during drying; thus fresh orris-root is almost odorless.

All these processes have as yet been but little studied, and it is only when we are thoroughly acquainted with the cause, conditions, and course of them that we shall be able to regulate and improve them, and here a wide field of research opens up for pharmacognosy. Our aim is not only to eliminate the deleterious actions of enzymes, but to subject the actions to the service of man and to make them useful for drugs, such as has been done in the preparation of foodstuffs—*e.g.*, in brewing and in making wine, cheese, bread—where the process of "fermentation" is due to enzymatic action. When we have learned to utilise the enzymes formed by higher plants, such as is now the case with myrosin in the preparation of oil of mustard and of emulsin in the splitting up of almond-amygdalin, the number of useful enzymatic actions will be considerably enlarged, and, to quote Goethe, from wonder we shall proceed to consideration, and from consideration to examination. We are led to this thesis by the philosophy of pharmacognosy, and by experiment guided by the process of thought. As Houston Stewart Chamberlain remarks: "La science sans philosophie est un simple bureau d'enregistrement."

PROGRESS IN PHARMACY.

A Quarterly Review of Some of the More Interesting Literature Relating to Pharmacy and Materia Medica.

By M. I. Wilbert, Washington, D. C.

Seldom if ever have interesting happenings along pharmaceutical lines so crowded each other as at the present time, and the end is not yet, for the immediate future promises to yield even more important developments than did the recent past.

The Cocaine Declaration.—Treasury decision No. 33,456 promulgated under date of May 23, 1913, is only just now being brought to the attention of retail druggists through the requirement that all importers making the prescribed declaration must secure similar declarations from all customers to whom cocaine, coca, their derivatives or preparations containing cocaine or its derivatives are sold. The Treasury decision is based on the provisions of the Food and Drugs Law of June 30, 1906, and requires that the importer declare under oath that the goods referred to are imported in good faith and will not be used in any way that may prove to be dangerous to the health of the people of the United States. The text of the declaration also binds the person making it to refrain from disposing of any of the articles involved without securing from the prospective purchaser a similar declaration under oath. The purchaser also agrees to preserve the declarations received by him and to make a report not later than January 15th of each year, of the amount of the materials on hand as well as the amounts bought and sold. The form of the declaration has been published in " Treasury Decisions," 1913, v. 24, No. 22, p. 13; Public Health Reports, v. 28, p. 2122; also in *The Druggists' Circular,* v. 57, p. 698.

Anti-Narcotic Bills.—The several anti-narcotic bills passed by the House some months ago have been reported by the Senate Sub-Committee to the Senate Committee on Finance with several amendments that will not materially affect the purpose or the nature of the bills. The only material change in H. R. 6282 being an amendment to bring that bill in accord with the provision of H. R. 1966, the bill to regulate importation of opium.—*Oil, Paint and Drug Reporter,* 1913, v. 84, November 10, p. 17.

Legislation Relating to Poisons and Habit-forming Drugs.—A supplement to Public Health Bulletin No. 56: "Digest of Laws and Regulations in force in the United States relating to the possession, use, sale and manufacture of Poisons and Habit-forming Drugs," has recently appeared in Public Health Reports (1913, v. 28, pp. 2111–2147, 2181–2218). This supplement includes 74 pages of closely printed material and contains only references to and abstracts of laws enacted during the year 1913. The number and the nature of these laws appears to evidence a growing discontent with existing conditions and undoubtedly presage a more active enforcement of laws relating to poisons and Habit-forming Drugs.

Bichloride Legislation.—An article in Public Health Reports for November 14, 1913, (v. 28, p. 2399) comments on the present day agitation for legislation bearing on the sale of corrosive mercuric chloride and points out that the most evident abuse in connection with tablets of corrosive sublimate is the present day practice of marketing them under a misleading title that gives no indication of their toxic character. The article also presents compilations of the number of suicides and of accidental deaths reported to the Registrar-General of England and Wales during the year 1912 which tend to show that the recognition accorded to a poison by its inclusion in the official schedule of poisons has little or no effect on the number of accidental poisonings due to its ingestion while the number of suicides from the use of scheduled poisons is markedly greater than from the use of non-scheduled poisons, or the corresponding deaths from accidental poisoning. This is but a reiteration of the frequently recorded observation that official recognition of a substance as a poison has suggestive influences and that the morbidly inclined are much more likely to use a substance recognized as having toxic properties rather than one regarding the toxicity of which they are in doubt.

Federal Legislation.—Among the recently introduced bills of interest to pharmacists not the least important are several that are designed to restrict interstate traffic in poisonous substances. The first of these, known as S. 3392, was introduced in the Senate by Mr. Ashurst, of Arizona, and is designed to regulate the importation, exportation or carriage in interstate commerce of bichloride of mercury. If enacted into law it would be a misdemeanor to transport in interstate commerce "any substance or poisonous compound known as bichloride of mercury unless said substance or compound be in the form of cubes and colored green so as to be readily distinguishable from non-poisonous tablets of similar appearance in common use."

The second bill, known as H. R. 9113, was introduced by Mr. L'Engle, of Florida, and would make it "unlawful for any person to produce, import, manufacture, compound, deal in, dispense, sell, distribute or give away any poisonous tablet, lozenge or troche not cubical in shape" or "any non-poisonous tablet, lozenge or troche not in spherical or disk shape."

A third bill, introduced by Mr. Cary, of Wisconsin, designated H. R. 9237, is designed to amend the District of Columbia pharmacy act and introduces a novel feature in poison legislation in that it requires that all orders, slips or prescriptions for poisons, particularly bichloride of mercury, be in triplicate, in addition to a poison register, and that one of the orders or prescriptions is to be retained as reference and one each is to be filed daily with the police department and the health department of the District.

Poisons.—Xrayser II.—The Poisons Schedule of England shows how difficult it is for legislation to keep pace with chemical research. Drugs having distinctly poisonous action are constantly being put on the market, and it has been pointed out recently that "there are more poisons not on the schedule than there are on it," and all these may be sold or dispensed by anybody, for legally the dispensing of poisons means only those that are scheduled.—*Chem. Circ.*, 1913, v. 57, p. 703.

The A. Ph. A. Election.—The balloting by mail for officers of the American Pharmaceutical Association for the year 1914–15 has resulted in the election of the following: President, Caswell A. Mayo, of New York; Vice-Presidents, L. D. Havenhill, of Lawrence, Kan.; C. H. Packard, of Boston; and Charles Gietner, of St. Louis.—*Drug. Circ.*, 1913, v. 57, p. 703.

Drug Trade Exhibition and Conference.—The exhibition held in the new Grand Central Palace, New York, October 2–9, is not regarded as having been much as a drug show, but was accompanied by a series of good meetings of pharmacists and physicians, and should go far toward awakening an interest in professional pharmacy. The meetings were developed by Mr. Otto Raubenheimer, who deserves credit for the method of conducting them, and for securing the several speakers, who while they confined themselves largely to the discussion of matters of local interest, will nevertheless have considerable influence on the development of pharmacy in other sections of the country.—*The Druggists' Circular,* 1913, v. 57, pp. 704–705.

Conference of Food and Drug Officials.—The conference of Federal and State officials interested in the enforcement of pure food and drug laws which was held in the City of Washington on November 14 and 15, should have a stimulating influence on the enforcement of pure drug laws as well as being the incentive for more concerted efforts in the enforcement of pure food laws. The conference was called as the result of a resolution adopted by the Association of State and National Food and Dairy Departments for the purpose of providing for active co-operation between State and National officials in the development of methods of analysis, the promulgation of standards and the proper enforcement of existing laws.

International Pharmacy Congresses.—Editorial: "One of the pharmaceutical surprises of the present time is the persistence of the International Congress of Pharmacy. Americans, Britons and Teutons have evidenced a willingness that these Congresses should die, but their pharmaceutical confrères of Gallic or Latin origin have persistently ignored this pessimistic attitude. The principal purpose of the origin of the International Congresses was accomplished by the signature at Brussels on November 29, 1906, of the international agreement respecting the unification of pharmacopœial formulas for potent drugs, which had been arrived at by the International Conference on the subject which had been held there in 1902. Despite the expectation that this international treaty would ring the death-knell of the International Congresses of Pharmacy, it has proved but an incentive in the promulgation of further meetings" of this kind.

The accomplishments of the several Congresses are briefly reviewed, and regarding the Seventh Congress held in Chicago in 1893, during the week commencing August 21, the Editor says, "The meeting was, from the international point of view, a trifle half-hearted, but good as far as it went."—*Chem. & Drug.,* 1913, v. 83, pp. 394–395, 424–426.

The Eleventh International Congress of Pharmacy held at Scheveningen and Leyden, Sept. 17–21, 1913, was well attended and appears to have been successful, though the attendance was largely confined to pharmacists from Holland, Belgium and France. English speaking countries were only sparingly represented; the United States having two delegates, Prof. J. P. Remington, of Philadelphia, and Prof. J. A. Koch, of Pittsburgh. The chief address, at the general meeting held on September 17th, was by Prof. Alexander Tschirch, who discussed the enzymes and their importance in pharmacognosy.

This Congress was the first to be held after the formation of the International Pharmaceutical Federation, and there is, therefore, no reason to be surprised at the fact that it was from many, if not from all, points of view more successful than any of the ten Congresses which preceded it.

As might have been expected the subject of international standards and the development of uniform methods of assay were discussed at length in several communications, and steps were taken to provide for an international pharmacopœial bureau to compile comments and criticisms along the lines suggested by Prof. Tschirch and to further develop uniformity in the standards and requirements of the several National Pharmacopœias. The trend of the discussion on this and related subjects is well reflected in the papers and abstracts published in British pharmaceutical journals and the following will serve to illustrate the interest shown by the delegates present. (See also this Journal, pp. 496, 534).

Compiling a Pharmacopœia.—Boldingh and Schoorl: The monographs of a pharmacopœia should be succinct and clearly subdivided, the tests for identity, impurity, and adulteration to be specially mentioned and printed in distinctive type; the order in which groups of reactions are given should be the same in all monographs; the number of reagents should be limited, replacing by others where possible inconvenient reagents (as H_2S and CS_2 by Na_2S and chloroform); they should also place in the first rank the observation of physical characters, the determination of physical constants, such as melting and boiling points, rotation power, and refractive index, and the microscopical examination of crystals.—*Chem. & Drug.*, 1913, v. 83, p. 488.

Alcoholic Strength.—van der Wal, G. H.: Discussed the desirability of adopting a uniform degree of alcoholic liquids for the preparation of medicinal substances expressed in percentage by weight. The author recommended the appointment of a committee to decide on an international table of mixtures of alcohol and water, percentages to be stated in weight, this table to be published by the International Pharmaceutical Federation.—*Chem. & Drug.*, 1913, v. 83, p. 490.

Galenical Preparations.—Dulière, W.: The value of a galenical medicament depends on the quality of its constituents and on the care with which it is made, and on neither of these points is it possible to have any certainty where the galenical is purchased ready made. The practical pharmacist knows by comparison that a product is abnormal, though he may not always be able to submit his proofs, but the inexperienced pharmacist does not know, and he is the one who procures these ready-made preparations.—*Chem. & Drug.*, 1913, v. 83, p. 484.

Minimum and Maximum Standards for Drugs.—Peck, E. Saville: The establishment of a minimum standard for the active parts of medicines without establishing a maximum is wrong. Although in a large number of cases the establishment of a maximum standard is unnecessary; it is in many others essential for the attainment of accurate and constant therapeutic effect.—*Pharm. J.*, 1913, v. 91, pp. 433–434.

Unification of Assay.—Hérissey, H.: Thinks it advisable to impose international methods of assaying medicines at the same time that the content in active principles is laid down. The assay process should be minutely described, and in cases where the strength of the galenical is to be adjusted from an assay, the method of preparation should be described.—*Chem. & Drug.*, 1913, v. 83, p. 485.

Purity Tests for Chemicals.—Bührer, C.: Favors a periodical revision of the pharmacopœias, every ten years where possible; a permanent commission in each country to which would fall the work of keeping in touch with scientific progress; and the creation of an International Pharmacopœial Bureau for the carrying out of the ideas put forward by Professor Tschirch.—*Chem. & Drug.*, 1913, v. 83, p. 485.

International Pharmacopœial Bureau.—Remington, Joseph P.: An International Pharmacopœial Bureau should be established in Europe. Success will depend upon the ability of the director. The detection of adulteration and the collection of information about fraud would be an important part of the work. Abstractors should aim at obtaining facts and should not be critical. The unification of standards and tests for chemical substances should be taken in hand, and the formation of a purity rubric for each chemical medicament.—*Chem. & Drug.*, 1913, v. 83, p. 487.

Regarding the organization of this Bureau, the following resolution was adopted: The Eleventh International Congress of Pharmacy desires to see continued the work toward the unification of Pharmacopœias so happily inaugurated by the Brussels Conference for the unification of heroic medicines. Considering that an International Congress is not qualified to give a pronounced opinion as to the work to be done by a similar institution, the second section asks the general meeting to appoint a commission, to submit within two months an organization scheme for an International Pharmacopœial Bureau. The scheme elaborated by this commission will be transmitted to the office of the International Pharmaceutical Federation, which within a month will communicate it for examinations to the official Commissions of the Pharmacopœias of the different countries.—*Chem. & Drug.*, 1913, v. 83, p. 490.

The invitation presented by Prof. A. Tschirch to hold the Twelfth International Pharmaceutical Congress in the city of Berne, Switzerland, was adopted at the concluding session of the Congress and the question of date was referred to the International Federation of Pharmaceutical Societies.

Narcotic Drugs.—C. E. Terry, Health Officer for Jacksonville, Fla., in a paper on " drug habitués and their bearing on the public health and welfare," read before the American Health Association at Colorado Springs, laid the blame for drug victims upon physicians. He stated that 50 per cent. of drug-users become so through taking drugs prescribed during illness, and declared that physicians are more dangerous than druggists in this respect. He favored State legislation to further physicians and druggists minimizing the practice of prescribing strong drugs to those addicted to their use.—*Pharm. Era*, 1913, v. 46, p. 508.

Mixtures of the United States Pharmacopœia.—Osborne, Oliver T.: Seriously questions the advisability of including in the Pharmacopœia of the United States a number of the now official complex mixtures because many of the ingredients are needless and useless. In fact it is generally recognized that these complex mixtures themselves are unscientific.—*J. Am. M. Assoc.*, 1913, v. 61, pp. 1289–1293.

Norwegian Pharmacopœia.—Den Norske Farmakope, 1913: The fourth edition of this Pharmacopœia has been finally issued and will be official from January 1, 1914. It will replace the work published in 1895, so that with the exception of Portugal, Great Britain now possesses the oldest Pharmacopœia now in force. In accordance with an existing agreement, the Latin nomenclature is in accord with that of the other Scandinavian countries, Sweden and Denmark, and is quite distinct from that of other European countries. The requirements of the Brussels Conference are reproduced in tabular form, and the articles corresponding to these that have been included in the Pharmacopœia are designated by the addition of the letters "P. I." to the sub-title. Somewhat striking is the relatively small number of galenical preparations included, 196 in all; thus there are only 29 tinctures in the Norwegian Pharmacopœia as compared with 67 in the British Pharmacopœia and 41 in the German Pharmacopœia.—*Chem. & Drug.*, 1913, v. 83, pp. 586–587.

British Imperial Pharmacopœia.—The proposals put forward by Mr. John C. Umney in his presidential address to the jubilee meeting of the British Pharmaceutical Conference have been received with much favor by pharmacists in Australia, and although the several propositions have not been discussed or even formally considered in England itself, it is believed that the propositions are favorably viewed so that the opinions of all pharmaceutical bodies beyond the seas should be ascertained for consideration when the time comes.—*Chem. & Drug.*, 1913, v. 83, pp. 669–670.

Hanbury Medal.—American pharmacists generally and graduates of the Philadelphia College of Pharmacy particularly were pleased to learn that the Hanbury medal was this year awarded to Dr. Frederick Belding Power, now the Director of the Wellcome Research Laboratories, London, England. Dr. Power was also accorded the unusual honor of being asked to deliver the address at the opening of the School of Pharmacy of the Pharmaceutical Society. The subject of this address which is reported in full in recent numbers of English drug journals was: "The influence and development of some of the researches of Daniel Hanbury."—*Chem. & Drug.*, 1913, v. 83, pp. 36, 61.

Drugs Sold to Dispensing Physicians.—Puckner, W. A.: Reports a comprehensive investigation on the quality of drugs sold to dispensing physicians and concludes that the examinations reported show that the random charge of sophistication and adulteration which has been repeatedly made against "physicians' supply houses" is unjustified. The examination does show as has been argued before, that standard drugs are likely to be of fair quality irrespective of the source from which they are obtained.—*J. Am. M. Assoc.*, 1913, v. 61, pp. 855–859.

How to Secure Reliable Drugs.—Howe, Oliver H.: While the modern drug store may be a social necessity as a general emporium of all sorts of small wares and ready-made medicines, for confectionery, cigars and fancy articles, it cannot and should not be relied upon as a source of reliable medicines. The well-equipped and conscientious druggist who has a high standard of work and lives up to it should be encouraged. No physician should jeopardize his patients or his own reputation by relying on a prescription service which he knows to be poor. If necessary, he should provide and dispense his own medicines.—*J. Am. M. Assoc.*, 1913, v. 61, pp. 1392–1393.

Alcohol as a Food.—Editorial: To say that alcohol may be a food is not to deny that it is a dangerous one. If it is given too freely its oxidation is incomplete and, what is more important, the untoward nervous effects become prominent. In ordinary conditions of health there is no occasion for the use of alcohol, and its introduction into the regimen of daily life can scarcely be defended on the grounds of nutritive needs.—*J. Am. M. Assoc.*, 1913, v. 61, pp. 966–967.

Alypin.—Schroeder: Does not agree with the statement of Impens that the toxicity of alypin is much lower than that of cocaine and that the maximum dose for the human subject is 0.2 gm. of alypin and 0.05 gm. of cocaine. He maintains that alypin is at least as toxic as cocaine, and supports the maximum dose given for it by L. Lewin, 0.05 gm., which has been adopted in the supplement to the Pharmacopœia published by the German Apotheker Verein. (*Deut. Med. Woch.*, 1913, 1, 459; *Apoth. Zeit.*, 1913, 28, 590).—*Pharm. J.*, 1913, v. 91, p. 504.

Balsam of Peru and Perugens.—Enz, Karl: All of the samples of genuine balsam of Peru examined complied with the requirements of the Pharmacopœia. The specific gravity occasionally shows a tendency to exceed the permissible limit. The tests given by the German Pharmacopœia will not eliminate perugens or other facticious balsams of Peru; some indication is, however, given by a comparison of the acid number, the iodine number of the isolated cinnamine, the nitric acid reaction and the behavior of the product with petroleum ether.—*Südd. Apoth. Zeit.*, 1913, v. 53, pp. 600, 608–609.

Brophenine, is a complicated phenetidine derivative, bromoisovalerylamino-acetphenetidine, of the formula $C_2H_5.O.C_6H_4NH.CO.$-$CH_2.CO.CHBr.CH(CH_3)_2$. It is a white amorphous powder, slightly soluble in water, odorless, and tasteless, melting at 150°. Dose: Five to 20 grains three times a day.—*Chem. & Drug.*, 1913, v. 83, p. 526.

Capsules.—Editorial: The gelatin capsule was invented by Mothes in 1833, and the French Academy of Medicine declared his invention to be an immense service to science and humanity. On March 25, 1834, Mothes and Dublanc applied for a French patent for gelatin capsules, and they obtained an additional patent on December 4th of the same year.—*Chem. & Drug.*, 1913, v. 83, p. 458.

Despyrin.—A remedy stated to be tartryl-salicylic acid has been put upon the market as the latest headache and neuralgic remedy. It has been examined by German analysts, who state that it is a mixture of acetyl-salicylic acid with potassium bitartrate.—*Chem. & Drug.*, 1913, v. 83, p. 358.

Digitalis.—Eggleston, Cary: Reports some clinical observations on the emetic action of digitalis and concludes that there is neither valid experimental nor clinical evidence that therapeutic doses of the digitalis bodies cause nausea or vomiting through local irritant action on the alimentary tract. All true digitalis bodies produce nausea and vomiting by direct central action, so that it is fallacious and wholly irrational to seek to avoid these symptoms resulting from the oral administration of any given preparation by resort to another preparation or to another channel of administration.—*J. Am. M. Assoc.*, 1913, v. 61, pp. 757–761.

Electr-HG.—Electromercurol is a colloidal suspension of mercury equivalent to 0.1 per cent. metallic mercury (Hg) and containing a small percentage of sodium arabate. Electr-Hg is an odorless, tasteless liquid appearing transparent and brown in color by transmitted light and opaque and gray by reflected light. The addition of potassium cyanide solution or of strong nitric acid yields clear, colorless solutions. The nitric acid solution responds to tests for mercury.—*J. Am. M. Assoc.*, 1913, v. 61, p. 868.

Hexamethylenamine.—Cuntz, W.: States that this drug (urotropin) cannot be regarded as absolutely harmless. With the usual dosage he has witnessed hematuria and albuminuria develop in two cases. (*Münch. med. Wchnschr.*, 1913, 40, No. 30).—*J. Am. M. Assoc.*, 1913, v. 61, p 815

Kresophine consists of coal tar deprived of all constituents other than phenols and derivatives of pyrocatechin. It forms a reddish-brown liquid, which is free from any burning taste, and is easily miscible with all organic solvents. Its use is identical with that of other coal tar products.—*Chem. & Drug.*, 1913, v. 83, p. 526.

Melubrin is described as sodium 1-phenyl-2,3-dimethyl-5-pyrazolon-4-amido-methan-sulphonate, the sodium salt of 1-phenyl-2,3,-dimethyl-5-pyrazolon-4-amidomethan-sulphonic acid, differing from antipyrine, $C_{11}H_{12}N_2O$, in that a sodium-amido-methan-sulphonate group, $NH.CH_2.SO_3Na$, has replaced a hydrogen atom of the pyrazolon group. It is a white, odorless, almost tasteless crystalline powder, readily soluble in water, but slightly soluble in alcohol. The aqueous solution is neutral in reaction but unstable.—*J. Am. M. Assoc.,* 1913, v. 61, p. 869.

Mesothorium.—Berlin Correspondent: All Germany is obsessed with the idea of procuring mesothorium to be used as a panacea for cancer. It is said to have the power of emanating rays similar to, but much more effective than radium, and the cost seems to be about as great. The substance is derived from the thorium waste in the manufacture of gas mantles, but proof is still wanting of the efficacy of the remedy.—*Chem. & Drug.,* 1913, v. 83, p. 447.

Methyl Alcohol.—Kroeber, Ludwig: Reviews the different theories in the famous Berlin poisoning case, and concludes that pure methyl alcohol has not the great toxicity attributed to it by certain authors. He finds that traces of dimethylic sulphate formed in the course of purification of the product are capable of poisonous action. —*Chem. & Drug.,* 1913, v. 83, p. 488.

Ninhydrin occurs in the form of colorless crystals readily soluble in water. When heated it becomes red at 125° C., swells at 139° and melts at 239–240° C. The aqueous solution colors the skin violet and reduces Fehling's solution. When heated to the boiling point in aqueous solution it gives a blue color in the presence of protein bodies or amino acids derived from them which have the amino group in the alpha position in relation to the carboxyl. It gives this reaction with compounds that no longer respond to the biuret reaction. Ninhydrin is not employed therapeutically, but is used as a reagent to determine the presence of albumin, peptone, polypeptids, and amino acids. This test is especially applied to demonstrate the presence in blood serum of specific proteolytic ferments, especially in the diagnosis of pregnancy, according to the method of Abderhalden.—*J. Am. M. Assoc.,* 1912, v. 61, p. 1377.

Ninhydrin Reaction.—Pearce, Richard M.: Reports negative results with the ninhydrin reaction as a test for amino acids in the serum of nephritics and others. A few tests were made also with ascitic fluid, but with like negative results.—*J. Am. M. Assoc.,* 1913, v. 61, pp. 1456–1457.

Novocol is sodium guaiacol phosphate. It forms a white crystalline powder, easily soluble in water and containing 45 to 50 per cent. of guaiacol. It is recommended in cases where guaiacol is indicated, in doses of 0.5 gramme three times a day.—*Chem. & Drug.*, 1913, v. 83, p. 526.

Paracodine is dihydrocodeine, prepared by reducing the alkaloid by nascent hydrogen. It is a strong base, forming needles melting at 65°, and is soluble in water. It is prepared in the form of the tartrate and the hydrochloride, both of which salts are easily soluble in water. It is recommended as a cough remedy in very small doses. —*Chem. & Drug.*, 1913, v. 83, p. 526.

Placentapepton is a preparation of peptone derived from the placenta and employed for the purpose of the optical tests for pregnancy according to Abderhalden. Placentapepton is a yellowish powder, soluble in water, and having the properties of peptone.—*J. Am. M. Assoc.*, 1912, v. 61, p. 1377.

Phenolsulphonephthalein.—Fishbein, M.: A report of a number of observations on the use of phenolsulphonephthalein as a functional test of the kidneys in scarlet fever. In the cases reported the dye was injected intramuscularly and elimination determined by the use of the colorimeter described by Cabot and Young (*Boston Med. and Surg. Jour.*, 1911, clxv, 549).—*J. Am. M. Assoc.*, 1913, v. 61, pp. 1368–1370.

Salvarsan.—Robertson, H. E.: Intramuscular injections of salvarsan and neosalvarsan produce severe destructive lesions which always heal slowly and often are complicated with hæmorrhages and sloughing abscesses. The severity of the reaction from the use of either drug is essentially the same, and the lesions produced by experiments on animals and in human beings are similar in every respect. Mercurial preparations when injected into muscles produce similar lesions, and the use of such preparations in this manner, in the majority of cases, is an unjustifiable procedure.—*J. Am. M. Assoc.*, 1913, v. 61, pp. 1698–1702.

Tannaphtol is a condensation product of tannic acid, albumen, and benzonaphthol. It is an amorphous powder, used as an internal antiseptic, or externally as a dusting powder.—*Chem. & Drug.*, 1913, v. 83, p. 526.

Tuberculin.—Editorial: The position of the pharmacist in relation to the supply of tuberculin is not so simple as it would appear. According to White, there is no such thing as standard tuberculin and no tuberculin manufacturer can guarantee that his product is of the same strength twice. There is no means of testing the strength of any given tuberculin save by experiments on the body of the patient whom it is proposed to treat. Considering the dangerous nature of this remedy it is a very serious matter. The situation is rendered still more difficult by the bewildering series of tuberculins issued by the various makers. The following list of initials are only a few that might be quoted: T. O., T. R., T. B. E., V. T., P. T. O., P. T. R., P. B. E., P. V. T., B. F., P. B. F., I. K., besides fat-free, water-extract, suspensions of various kinds, and modifications advocated with a wealth of literary embroidery by Dr. A., Dr. B., and so on *ad infinitum.*—*Chem. & Drug.*, 1913, v. 83, pp. 362–363.

Vaccine Therapy.—Richards, John H.: Reviews the recent literature relating to vaccine therapy and concludes that vaccines are for one purpose only, that is, to produce prophylactic immunity and to increase the resistance of an individual by active immunization, and they should never be used to the exclusion of other methods of treatment that tend to limit the extent of an infection.—*J. Am. M. Assoc.*, 1913, v. 61, pp. 845–847.

Volatile Oils.—Book Review: Calls attention to the second volume of "Die Ætherische Œle," by Gildemeister and Hoffmann. The matter which occupies this second section of the work is the detailed description of the known oils, arranged systematically according to the natural orders of the plants from which they are derived: the present volume includes cryptogams, gymnosperms, monocotyledons, and a considerable number of dicotyledons. The work of Gildemeister and Hoffmann is certainly the most up-to-date, as it is also the most comprehensive on the subject, and it is safe to say that no chemist who is concerned with volatile oils can afford to be without it.—*Pharm. J.*, 1913, v. 91, p. 438.

The Bad Taste in Hypochlorite-treated Water-supplies.—Editorial: There has been frequent and often bitter complaint about the taste of water treated with hypochlorite solution, and while it is recognized that the danger from water-borne diseases is greatly reduced by the hypochlorite treatment, the necessity of having to bear the burden of daily complaint and to meet the indignant protests of thousands of aggrieved water-drinkers, has no doubt been a factor in preventing the efficient use of hypochlorite. Lederer (Proc. Ill. Water Supply Assn., 1913, p. 235) has confirmed the advantage of sodium thiosulphate for neutralizing the residual chlorine.—*J. Am. M. Assoc.*, 1913, v. 61, p. 1461.

Venereal Diseases.—An important discussion in the Sections of Dermatology and Syphilography of the International Medical Congress centred about the control of venereal diseases. These sections passed resolutions urging the government to institute a system of confidential notification of syphilis to a sanitary authority and to make systematic provision for the diagnosis and treatment of all cases of syphilis not otherwise provided for. Sir Malcolm Morris said the state enforces the notification of many infectious diseases, takes charge of the insane, encourages the authorities to build fever hospitals, carries out a rigid inspection of factories and work-shops, and in a thousand ways stretches out its long arm to safeguard the community, yet it does not lift a little finger to protect the nation from a devastating disease which, more ruthless than the destroying angel who slew the first-born, smites the unborn babe.—*Chem. & Drug.*, 1913, v. 83, pp. 331–356.

PHARMACEUTICAL MEETING.

The first Pharmaceutical Meeting this fall was held in the Museum of the College on October 17, with Eugéne Charabot of the Sorbonne, Paris, the guest of honor. The major part of his address on the " Formation and Distribution of Odorous Products in Plants " is found in another part of this issue. Professor Samuel P. Sadtler presided and introduced Dr. Charabot as one of the world's recognized authorities on Volatile Oils.

The carbohydrates, albuminoids, and the fatty substances, which comprise the important products of plant metabolism have been thoroughly studied. But there is a multitude of more ephemeral products, often unsuspected in their normal presence, among which are the odorous compounds. The subject of perfumery, therefore, Dr. Charabot suggested, while having great practical aspects, deserves well a place in our knowledge of a purely philosophical order and is closely allied with and depends upon the subject of physiological botany. With this introduction the speaker endeavored to give the proper perspective to his subject. While the address was given in French, it was thoroughly enjoyed by those who attended, even though not very familiar with the language, due to the very engaging style of Dr. Charabot.

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